VEDIC PHYSICS

With best wishes to
Honourable Shri Anantha Kumar.
Looking forward to your
Comments.

— Raja R. Roy

Vedic Physics

Scientific Origin of Hinduism

Raja Ram Mohan Roy, Ph.D.

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Dedicated to Vedic Sages

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PREFACE

Who am I? Why am I here? These are the questions that have arisen in my mind since as long as I can remember. Perhaps it was because of the Samskara I received from my father, who woke me up very early in the morning everyday and recited verses from Ramacaritamanasa, when I was a kid. I was spiritually oriented from my childhood. As a young boy, I read the Gita regularly and tried to follow its teachings. In school Mathematics and Physics were my favorite subjects. When I got an opportunity to learn Sanskrit in school, I found Sanskrit as fascinating as Mathematics and Physics.

In school and college I kept reading books on Hindu religion and philosophy to find the answers to the deepest questions of existence. In university I came across relativity and quantum mechanics, and found these subjects fascinating. Somewhere deep inside I had the feeling that I would find the answers to my quest of my existence in the discoveries of modern science. I reasoned that if religion presents the true view of reality, then it cannot be contradictory to the findings of science. However, they presented diametrically opposite views of the same world, and it became a question of choosing which one best represents the reality. I kept on weighing the evidence, and by the time I had finished my PhD. in Materials Science and Engineering at a reputed university in USA, I found the evidence to be overwhelmingly in the favor

of modern science. May be it was the intellectual environment of American universities, or it was my specialization, I had become a more materialistic person than I used to be, and I had become more or less an atheist. Science presented to me a world without a God, a world without any meaning and a world without any purpose for existence. This was not a very comfortable position to live by, but I was prepared to live with it, if that is what all the evidence pointed to. However, somewhere deep inside I had doubts, and questions kept on surfacing in my mind. Could modern science be wrong somewhere? After all, modern science does not explain satisfactorily how randomness can generate such complex structures as human beings. As a last attempt to find the meaning and purpose of life, I started to read the most sacred scripture of Hinduism, the Rgveda. It is a very difficult book to follow, with no apparent planning behind its organization. It was when I was reading the ninetieth hymn of the tenth book of the Rgveda, known as Purusa hymn that an idea struck me. This hymn is about the creation of the universe from the Supreme Being. The eighth verse talks about the creation of domesticated and wild animals. I said to myself that so far the creation story was making sense, and suddenly this subject of animals has come up. What were animals doing so early in creation? Then, I realized suddenly that it was not about animals at all. Domesticated animals live together, and wild animals live alone. Domesticated animals are symbolic representation of particles that live together, and wild animals are symbolic representation of particles that live alone. These particles, called bosons and fermions, are very familiar to physicists. If my reasoning was correct, then it was likely that the Vedas are a coded book. After that I started to read the Vedas very carefully, wondering about the meaning of each term I encountered. Soon it became clear that I was not dealing with primitive intelligence here, as all the history books declare. It became clear that the Vedic sages had discovered the subtle nature of reality, and coded it in the form of the Vedas. This

explain the reason why extraordinary steps were taken to preserve the Vedas, and the honor given to the Vedas by Hindus, even though its meaning is little understood.

One argument that is often invoked to discredit such attempts as to finding scientific meaning of scriptures, is why do these interpretations are made only after the discovery of the scientific facts. I am well aware of this argument, and I have tried to show how the scientific meaning of the Vedas is very different from what modern science says. The cosmology of the Vedas is completely different from modern cosmologies, and without understanding Vedic cosmology, the Vedas would seem meaningless. All the information that I have used to arrive at my interpretation is presented in this book. At some point the reader may start to wonder whether all these verses are really there in the scriptures. I would like to assure the reader that I have taken extreme care in providing the exact references to the sources used in this study. We are often told that the Vedas contain very abstruse scientific information, but we can not pinpoint to specific verses in the Vedas, if we are asked to prove this point. Nothing is said in this book without providing the specific location of the verse in the scripture. The verses have been translated in English as close as possible to the apparent meaning. The scientific meaning of the verse is then explained by dissecting the words and providing supporting evidence from other scriptures. The reader is encouraged to go to the original sources in the case of doubt. I have not made up any mantras, and this can be verified easily, as Hindu scriptures are thousands of years old, and standard versions of these scriptures are easily available. All I have done is to provide a framework in which these mantras start to make sense. Once we understand that the Rgveda is a book of particle physics and cosmology, men it becomes clear by reading the scriptures following the Vedas that this ancient science was gradually forgotten over time. It also follows that modern science is not the only way to investigate the subtle nature of reality.

I am indebted to my parents for the Samskara I received from them. I would like to express my sincere appreciation to my wife Manju for her continued and enthusiastic support to this work. Professor Subhash Kak deserves a very special acknowledgement for his review, support, advice and encouragement. I would also like to thank David Frawley for reading the draft and providing critical comments and suggestions.

Raja Ram Mohan Roy
Toronto, Canada
August 28, 1998

FOREWORD

The Vedic texts are a great puzzle to historians. These ancient hymns and their prose commentaries ask the most subtle questions about the nature of self, questions that the West has started asking only recently. What was the cultural context in which Vedic ideas arose? Was the mystical basis of Vedic thought connected to a comprehensive system of knowledge in which the outer sciences had their own place?

Western scholars have considered spirituality and psychology to be the main contribution of Vedic thought. That this is incorrect is clear from the recent scholarship that shows that the Vedic people knew considerable mathematics, astronomy, medicine and other sciences. The chronological frame for Indian culture has also undergone a revision. Archaeological studies have shown that there is a continuity in Indian culture that goes back to about 8000 B.C. The Indian rock art has an even longer prehistory; experts have claimed that the oldest paintings are about 40,000 years old.

Raja Ram Mohan Roy's book adds to this emerging picture with an audacious reinterpretation of Vedic system of knowledge. Roy's basic premise is that the mind - by analysis, reflection on everyday phenomena, and grasping the nature of its own self -can discover a considerable amount of science, and this is what the Vedic rishis did. He presents a new framework for the understanding of the Vedic hymns from the point of view of physics and then he draws parallels with recent theories on the nature of the universe.

Roy's method goes counter to the orthodoxy that outer knowledge cannot be discovered by an analysis of the inner. But there is accumulating evidence from cognitive science and biology that the inner and the outer are connected. For example, biological systems are equipped with clocks tuned to the motions of the sun, the moon, and other astronomical phenomena. Indian thinkers have always insisted on the presence of such connections, claiming that this is how the mind is able to know the physical world. In Vedic thought this is expressed by the notion of "bandhu" that connect the biological, the terrestrial, and the astronomical. In this sense, Raja Roy belongs to the classical Indian tradition.

The commonly held view of science is that painstaking observations of the regularities in nature led us to the discovery of the universal laws. The process began with the planets, then it took on terrestrial phenomena, ultimately encompassing biology, genetics, and finally the current frontier of brain and mind. This process is stood on its head in the Indian texts. They speak of mind and of the nerves in the brain and the connections between senses and the outer world. The madhu-vidya of the Upanisads is the doctrine of the bandhu, as in honey and bees. The Purusa of the cosmos and that of the individual are the atman, the immortal Brahman, the whole universe (idam sarvam). The bandhu between the large and the subtle include: earth and body; water and seed; sun and eye; moon and wind; wind and breath; fire and speech; and so on. This is to affirm that knowing oneself one can know the world!

The Vedic focus on mind and consciousness is paralleled by the central place of the observer in modern physics. In quantum mechanics the state changes in an abrupt fashion when an observation is made and this has prompted some physicists to claim that consciousness should be a primary category of the universe, distinct from physical matter. Not everyone agrees. |There are those who claim that consciousness emerges out of the complexity of the organization of the brain. But nobody has been able to provide a credible model of this process.

The lowly animals possess abilities of pattern discrimination that go beyond any computer. Animal intelligence appears to be a riddle and its resolution may lie in the bold ideas of the modern physicists that echo the old rishis of the Vedas. Free will cannot be squared with scientific determinism, where everything is a part of the web of stimulus and response. In this web, how can understanding arise? On the other hand, an active consciousness leaves room for freedom. It doesn't explain where and how this agency operates within the brain-machine. That such a paradox remains was known to the Vedic rishis.

I described the matter in the form of a verse once:

Crawling the tear between being and becoming
our exertions create vibrations
that ease the path
and change time past.
If the past is made of stone
how can there be any freedom
in our becoming?
We make history when we observe
the slashing of the fabric
of time past and time future
opens the window on freedom.
Connections bind us
from time to non-time
beyond the seven sounds
of rivers
bells
brazen vessels wheels of
carriage croakings of frogs
rain
the echo in the cavern.

The Vedic hymns are full of statements that, if taken literally, make no sense. It is also full of riddles and unusual images. One needs to define a suitable context to understand why horses may have wings or the cosmic man has thousand heads, thousand eyes, and thousand feet. The tripartite model of knowledge at the basis of the hymns helps in their understanding. Roy claims we can go even further by considering specific physical associations for Vedic gods. Roy has views on the archaeology of ancient India also. He claims that the Sindhu-Sarasvati cultural tradition is the locus of the Vedic people. This claim is being increasingly made by scholars and so Roy is not alone. He uses this identity, together with his interpretive apparatus, to propose solution to several old problems related to the Harappan civilization.

But could the Vedic rishis have anticipated physics with its categories of different kinds of particles and forces? Certainly not in the direct sense that physics is described now. That the rishis did anticipate subtle notions of potential and atomic structure is known through the systems of Samkhya and Vaisesika. It is plausible that they had an intuitive idea of more categories, not systematized in the darsanas. Did they do so from the patterns the outer senses and the inner instrument of the mind create? And do these patterns conform to the nature of the physical universe? In other words, can we say if there is an ultimate book of physics then it can also be read by decrypting the nature of our senses?

Roy's book is a bold, new way of looking at Vedic physics. Since he is a pioneer, this is not the place to quibble with the details of his story. We celebrate the new path he has hewn through the bush of old scholarship. It is the task of future researchers to further sharpen and modify the ideas of Roy.

Subhash Kak, Ph. D. author of The Astronomical
Code of the Rgveda
Tulum, Yucatan August
12,1998

Transliteration Guide

अ a as in **a**mazing
आ ā as in f**a**ther
इ i as in f**i**ll
ई ī as in pol**i**ce
उ u as in b**u**sh
ऊ ū as in r**u**de
ऋ ṛ as in me**rr**illy
ए e as in th**e**re
ऐ ai as in b**a**t
ओ o as in g**o**
औ au as in c**o**nch
क k as in **k**ill
ख kh as in **kh**aki
ग g as in do**g**
घ gh as in **gh**ost
ङ ṅ as in ki**ng**
च c as in **ch**ild
छ ch as in **chh**ole
ज j as in **j**ump
झ jh as in he**dge**h**o**g
ञ ñ as in pi**n**ch
ट ṭ as in **t**alk
ठ ṭh as in **th**ug
ड ḍ as in **d**uck
ढ ḍh, as in a**dh**ere

ण ṇ as in Viṣṇu
त t as in **t**antra
थ th as in **th**eory
द d as in **th**is
ध dh as in **dh**arma
न n as in **n**otice
प p as in **p**ond
फ ph as in **f**ond
ब b as in **b**ond
भ bh as in a**bh**or
म m as in **m**other
य y as in **y**ellow
र r as in **r**ed
ल l as in **l**ight
व v as in **v**isit
श ś as in **s**ure
ष ṣ as in Viṣṇu
स s as in **s**ister
ह h as in **h**eat
क्ष kś as in La**kś**mī
त्र tr as in **Tr**iśūla
ज्ञ jñ as in ya**jñ**a
ं ṃ as in Sa**n**skrit (Anusvāra)
: ḥ as in Āpaḥ (Visarga)

"In ancient and modern times, wonderful ideas have been carried forward from one race to another. It has been always with the blast of trumpets and the march of embattled cohorts. Each idea had to be soaked in a deluge of blood. Each word of power had to be followed by the groans of millions, by the wails of orphans, by the tears of widows. This, many other nations have taught, but India for thousands of years peacefully existed. Ideas after ideas have marched out from her, but every word has been spoken with a blessing behind it and peace before it. We, of all nations of the world, have never been a conquering race, and that blessing is on our head, and therefore we live."

- Swami Vivekananda

1. Vedic Legacy

"Veda is the source of all Dharma" declares Manusmrti 2.6. As we shall see this statement is no exaggeration. There is no major religion on this planet, which has not been influenced by the Vedas. The creation stories of all major religions are based on the Vedas. Though all other religions have forgotten their Vedic foot or have been forgotten, there is one religion, Hinduism that has kept the flame of the Vedic wisdom burning continuously. In order to understand Hinduism, we have to go five thousand years back in time to the region on both sides of the Indo-Pakistani border for here a mighty civilization once arose, and from the

scientific achievements of these people a way of life emerged, which was later termed Hinduism. This civilization is called Indus Valley Civilization, and their scientific knowledge was coded in the sacred books called "Vedas". Veda means knowledge and is derived from root "Vida" meaning to know. The knowledge was passed from generation to generation with the explicit instructions that no matter what happened not a single letter of this body of knowledge should be changed. Great care was taken to preserve the Vedas, and we are fortunate that it has come to us in the same form it was intended.

The Vedas are the foundation of Hinduism and the most authoritative of all Hindu scriptures, which are divided in two groups. The first group is called Sruti, meaning heard, and the second group is called Smrti, meaning memory. In a liberal sense, the Vedas, the Brahmanas, the Aranyakas and the Upanisads are considered Sruti, while in a conservative sense only the Vedas are considered Sruti. Rest of the scriptures including the Dharma Sastras and the Puranas are considered Smrti. There are four Vedas: Rgveda, Yajurveda, Samaveda, and Atharvaveda. The Vedas are considered Apauruseya meaning not authored by a human being. Traditional viewpoint is that the Vedas were heard by sages during deep meditation and are work of God. Somewhat in contrast with the viewpoint of different sages receiving the Vedic knowledge at different epochs is another traditional viewpoint that the Vedas were given to mankind in the beginning of the creation by God. Here we have to make a distinction between the knowledge contained in the Vedas and when that knowledge was discovered. The electron had existed before it was discovered. As we will see in this book, the Vedas are abort ancient cosmology. The laws governing the evolution of the universe have existed from the beginning of the universe. This explains why the Vedas are as old as the universe. However, the viewpoint of the Vedas being received by mankind in the beginning is wrong, because there were no human beings back

then. Trie major contention of this book is that the Vedas were discovered at the dawn of Indus Valley Civilization, and therefore the Vedas have been discovered only 5000 years ago.

1.1: The Vedas

What are the Vedas about? Are they product of primitive minds, who were expressing the natural phenomena of rain, clouds and thunder as medieval commentators describe? Are they songs of pastoral people as modern historians say? Have Hindus been wrong all along? Why did Hindus have so much respect for a book that is seemingly about cows and horses, about rain and clouds? What is that extraordinary knowledge in the Vedas, so that Indians for thousands of years have considered it as the source of all knowledge? In Manusmrti 2.7, the Vedas are told to be the books of all fields of knowledge. In Sanskrit the word for believer is "Astika". In other parts of world a believer means one who believes in God. In India it was not so. Astika meant one who believed in the Vedas. Manusmrti 2.11 declares that "nastiko vedanindakah" meaning one who criticizes the Vedas is a non-believer. One may not believe in God and still can be a believer.

The most authoritative among the four Vedas is called Rgveda. Other three Vedas contain several verses that are found in the Rgveda also. Each verse in the Rgveda is set to a metre called Chanda and has pronunciation marks called Svara. Each verse has one or more sages (Rsis) and deities (Devatas) associated with it. Rsis are supposed to have written or received the verse, and Devatas are supposed to be the gods in whose praise the verse has been written. Nirukta 2.11 describes Rsi as one who has seen the mantras. There are big problems with this traditional viewpoint. Several of the sages as well as deities are animals or inanimate objects like fish, frog, rivers and stones. Several verses have more than one sages and deities. There is a very simple

solution to this problem.The Rgveda is the book of ancient cosmology, where the authors have chosen fundamental particles and forces of nature to describe the cosmology in a dramatic way. Sages are not the authors of the verses, but they are also fundamental particles and forces, and so are the deities. Thus the sages Vasistha and Visvamitra are not sages, and deities Mitra and Varuna are not gods, but they all have precise scientific meaning. This viewpoint puts a constraint on each mantra. The sage and deity of the mantra must be present at the epoch described by the mantra. For example when a mantra describes what was there before the creation, the sage and the deity of that mantra can not be what was not there before the creation. The Purusa hymn of the Rgveda (10.90) describes the moment of creation, and we find that the sage and the deity both of this hymn are God himself, because nothing else was present at that time» The scientific interpretation of the Vedas also explains why there are no hymns dedicated to Aryama, because dedication of hymns itself has a scientific meaning. We will learn more about this when we discuss Aryama later in this book.

A great deal of effort has gone into passing the Vedas in their original form. The Vedas were passed on orally, but it is a vast body of literature, and very minor changes crept in among the different teachers. This gave rise to different branches of the Vedas, which are nearly the same. They vary sometimes in pronunciation of the words, or sometimes have words replaced by other words with similar meaning apparently to clear the confusion in the meaning of the verse, and in very rare cases replacement of a verse by another. Saunaka has mentioned five branches of the Rgveda, but currently only one of them called Sakala is available. The Yajurveda has two branches, which differ significantly from each other. One of them is called Sukla or the white Yajurveda, and the other is called Krsna or the black Yajurveda. Mahidhara in his commentary on the white Yajurveda gives a strange story about how the Yajurveda became two.

Vaisampayana taught the Yajurveda to Yajnavalkya, and once he got upset with him. So he asked Yajfiavalkya to return the Yajurveda. Yajfiavalkya vomited the Yajurveda by the practice of Yoga, and other students of Vaisampayana ate it by taking the form of birds (Tittiri). Thus the Yajurveda became black, and this branch is called the Taittiriya Samhita. Yajfiavalkya prayed to sun and sun came in form of a horse (Vajin) to return the Yajurveda. Thus the white Yajurveda is called the Vajasaneyl Samhita. What seems likely is that the Yajurveda has been written in two parts originally based on some scientific considerations. There are references to twelve branches of the black Yajurveda in Puranas, out of which three are available called Taittiriya, Maitrayani and Katha Samhita. Seventeen branches of the white Yajurveda are mentioned, but only two are available called Vajasaneyl or Madhyandina Samhita and Kanva Samhita. Normally when the Yajurveda is mentioned, the Vajasaneyl branch of the white Yajurveda is meant. Three branches of the Samaveda are available currently, Kauthuma, Ranayaniya and Jaiminlya, the first one being the most popular. Patanjali has referred to nine branches of the Atharvaveda, but only two have survived, Paippalada and Saunaka, latter being the more popular.

The Atharvaveda has been the subject of intense discussion among scholars, many of whom do not even accept it as part of the Vedas. Some scholars even go to the extent of saying that there is only one Veda, the Rgveda. Whatever be the case, it is accepted by everyone that the Rgveda is the oldest Veda and the most authentic. This book is mostly concerned with the Rgveda, and shows that the Rgveda is a book of cosmology. I have quoted other Vedas and later scriptures in order to interpret and corroborate the meaning of the Rgveda. Once the physics of the Rgveda is completely understood, I believe that other Vedas can be tested for their authenticity. As the Rgveda is a book of cosmology, it obviously follows that there is no human history in the Rgveda.

1.2: The Vedas and Cosmology

Whether there is human history in the Vedas or not, has been a subject of controversy from the beginning. The Vedas are considered eternal and logic demands that an eternal book can not contain mundane stories about human beings. While most commentators agreed with this view, many of them still elaborated about several Vedic themes as history. The main reason being that they hardly had any clue as to what the Vedas were about. The Vedas have been extensively studied and commented on by Indian intellectuals for all through history. Several of them certainly had the idea that the Vedas are about cosmology, but by that time the scientific means by which the Vedas were discovered and disseminated were lost. With the rise of modern science it should have been feasible to crack the Vedic code at least three decades earlier, but here lies the greatest tragedy of India. Under the Marxist grip Indian intellectuals have been made ashamed of their heritage, and most educated Hindus are ready to parade with the banner "We are ashamed to be Hindu" at the drop of a hat. Most educated Indians including scientists have no clue as to what is in the Vedas. The Vedas are written in Sanskrit and most educated Indians can not understand it as there is a conspiracy to finish Sanskrit and everything else that Hindus should be proud of. There are very few Vedic scholars left in India. Study of the Vedas is in the state of rapid decline. The families which recite and remember the Vedas can be counted on fingers. The Vedic scholars have little knowledge of modern science, and scientists have little knowledge of the Vedas, and for this reason the real meaning of the Vedas has eluded us. Many Vedic scholars have come to the conclusion that the Vedas are primarily concerned with cosmology, however they are not in a position to show that Vedic cosmology has the solutions to the most difficult problems of modern cosmology. Yudhisthira Mimamsaka writes[1]:

From the study of the Vedic literature several times I have come to the conclusion that Srauta Yajnas are only a representation of the evolution of the universe from its beginning to the end. Like dramas are played to remember history, the process of various Srauta Yajnas describes the science of cosmology"

He could not have said it better, but the problem is that Vedic scholars and modern scientists have never sat together to discover the ultimate secret of the cosmos.

1.3: The Indus Valley Civilization and the MahabharataWar

The knowledge contained in the Vedas is very abstruse, and is well beyond the comprehension of ordinary human beings. Therefore Vedic sages coded the knowledge in a simple form in which it could be understood by everyone. The Rgveda itself testifies that it has a hidden meaning in verse 4.3.16. Sage Bharata in his Natyasastra 1.23 refers to the sages who knew the hidden meaning of the Vedas. This coding of knowledge proved to be very successful in disseminating the knowledge to common folks, which is evident from the seals found in the Indus Valley Civilization. Almost all the seals have Vedic motif and the writings also represent Vedic ideas. The people of the Indus Valley Civilization seem preoccupied with Vedic knowledge, which is only understandable considering that they possessed the scientific knowledge from which even modern scientists can learn. For nearly a thousand years there was little change in the life of the Vedic people. There must have been scientific ways through which this knowledge was obtained. On the eve of "Mahabharata war" our ancestors believed that their knowledge was in the danger of being lost. They anticipated the disaster that was coming, and deliberated about how to save the Vedic knowledge. They could have written it down, but writings could be destroyed. Therefore

they decided that they will organize the Vedic knowledge and instruct pupils to memorize it, who will pass it on orally. The chief Vedic scientist was Krsna Dvaipayana also known as Vedavyasa, who taught the Rgveda to Paila, the Samaveda to Jaimini, the Yajurveda to Vaisampayana and the Atharvaveda to Sumantu (Bhagavata 1.4.21). They taught it to other pupils and they in turn to more other pupils. These pupils spread in every direction and tried to preserve the Vedas from disappearing.

1.4: Avesta

One group reached Iran and started to practice Vedic Dharma there. The religious scripture of ancient Iranians was the Avesta. The Avesta available today is only a fraction of what existed thousands of years ago. When Alexander captured Iran in 326 B.C. after a bloody war, he destroyed each copy of the Avesta available. After return of political stability Persian priests tried to salvage the Avesta and much was written out of memory. But bad luck returned again to Persians in seventh century when they were defeated by Muslim invaders in 642 A.D. Within a hundred years Persians were forcibly converted to Islam. A few Persians fled Iran in search of a place where they could freely worship and follow their religion. They returned to their original homeland in India where they are a thriving community called Parasis. The Avesta is divided in five parts: (1) Yajna, of which Gatha is a part, (2) Vispareda, (3) Vendidada, (4) Yasta, and (5) Khurda Avesta. Avesta can also be divided in two parts : main Avesta and Khurda Avesta. Main Avesta includes Yasna, Vispareda, Vendidada, and Yasta. There is remarkable similarity between the language of the Vedas and the Gatha. Several words are common or there is a difference of one letter. Grammar and meters are also similar.

1.5: Brahmanas

After the Mahabharata war the knowledge contained in the Vedas was gradually lost. As the knowledge contained in the Vedas started to make no sense at all, it became difficult to preserve the knowledge. To preserve the meaning of the Vedas, commentaries on the Vedas were written. These are called the Brahmanas, and most comprehensive of them is the Satapatha Brahmana. To preserve the structure of the Vedas, Pratisakhya books, Siksa books and Anukramanika books were written.

All Brahmanas are associated with a Veda. The Aitareya Brahmana and the Kausitaki Brahmana are associated with the Rgveda. The Brahmana of the Taittiriya branch of the black Yajurveda is the Taittiriya Brahmana. The Satapatha Brahmana is the Brahmana of the white Yajurveda. The Jaiminiya Brahmana is the major Brahmana related to the Samaveda, minor Brahmanas being Samavidhana, Devatadhyayi, Vamsa and Samhitopanisada Brahmana. The Gopatha Brahmana is related to the Atharvaveda.

The Satapatha Brahmana is a milestone in the development of the Vedic literature. Several centuries must have passed between the Mahabharata war and the writing of the Satapatha Brahmana, because the Satapatha Brahmana shows a significant loss of Vedic science. There are several new ideas in the Satapatha Brahmana that are not present in the Vedas. There is hardly any legend of creation among the ancient world, the seed of which can not be shown to be in the Satapatha Brahmana. Second wave of emigration from India happened after the composition of the Satapatha Brahmana, and a prominent group among them settled in Greece. Greek mythology is a direct borrowing from the Satapatha Brahmana. Many of the Greek legends are not found in the Vedas, but found in die Satapatha Brahmana, and this fact puts a big hole in the theory of original homeland being other than India. If all Indo-Europeans races had some other homeland

from which they dispersed, then Greek legends should match Vedas and not the Satapatha Brahmana. The contention of this book is that India is the cradle of civilization, and at least three major emigrations from India have taken place at different epochs, first after the Mahabharata war, second after the composition of the Satapatha Brahmana and third after the composition of early Puranas. The Gods are same in the Vedas and the Brahmanas. A new god Prajapati comes in the picture in the Brahmanas. All gods are described as born from Prajapati.

1.6: Aranyakas and Upanisads

Aranyaka means pertaining to forest and Upanisad means to sit near. Similar to the Brahmanas, the Aranyakas and the Upanisads are also related to the Vedas. Aitareya and Sankhyayana Aranyakas are connected to the Rgveda, Tavalkara and Chandogya Aranyakas to the Samaveda, Taittiriya and Maitrayani Aranyakas to the black Yajurveda and Brhadaranyaka to the white Yajurveda. Aitareya and Kausitaki Upanisads are related to the Rgveda, Chandogya Upanisad and Kenopanisad to the Samaveda, Kathopanisad, Taittiriya, Maitri and Svetasvatara Upanisads to the black Yajurveda, Brhadaranyaka and Isa Upanisads to the white Yajurveda, and Mundaka, Mandukya and Prasna Upanisads to the Atharvaveda. Note that the Brahmanas and the Upanisads both are based on the Vedas, and therefore the Upanisads are not a product of rebellion from the ritualism of the Brahmanas. The Upanisads contain most beautiful expressions of human thought. In Taittiriya Upanisad 1.11 a teacher gives the following advice to new graduates:

"Speak only the truth, follow the Dharma, do not be heedless about self-study. Mother is god, father is god, teacher is god, guest is god. Only perform those actions which are blameless, nothing

else. Follow only those of our behavior, which are good, not the others."

1.7: Sutra Literature

The Sutra period is considered later than the Brahmana period. The style of the Sutras is completely opposite of the Brahmanas. While the Brahmanas are very elaborate in their treatment of any subject, the Sutras take recourse to extreme brevity. The Sutra literature is of three types: Kalpasutra or Srautasutra, Grhyasutra and Dharmasutra.

Sankhayana and Asvalayana Srautasutras are related to the Rgveda, Masaka, Latyayana and Drahyayana Srautasutras to the Samaveda, Katyayana Srautasutra is related to the white Yajurveda, Apastamba, Hiranyakesina and Baudhayana Srautasutras to the black Yajurveda, and Vaitana Srautasutra to the Atharvaveda. The Srautasutras describe the rituals related to Yajnas.

Sankhayana and Asvalayana Grhyasutras are connected to the Rgveda, Gobhila Grhyasutra to the Samaveda, Paraskara Grhyasutra to the white Yajurveda, Apastamba Grhyasutra to the black Yajurveda, and Kausika Grhyasutra to the Atharvaveda. The Grhyasutras describe the rituals to be performed from birth to death for a Hindu.

The Dharmasutras are not specifically related to individual Vedas. Dharmasutras of Apastamba, Hiranyakesina and Baudhayana are presently available. Dharmasutras discuss the behavior of Hindus in their day-to-day life.

1.8: Vedangas, Parisistas and Anukramanis

Vedanga means organ of the Veda and Parisista means appendix.

Vedangas are considered very important to study the Vedas. There are six Vedangas: Siksa (Pronunciation), Chanda (Meter), Vyakarana (Grammar), Nirukta (Etymology), Jyotisa (Astronomy) and Kalpa (Ceremonial). Siksa texts are Pratisakhyas of Rgveda, Yajurveda and Atharvaveda. Parisista means appendix, and Parisistas explain the meaning of Sutras. Presently available Parisistas are Asvalayanagrhyaparisista, Gobhila Samgraha Parisista and Chandogyagrhya Parisista. Anukramanis list the order of verses and other information related to the organization of the Vedas.

1.9: Puranas

Puranas are the latest among Hindu scriptures. What is present as a seed in the Vedas, takes the form of a big tree in the Puranas. There are eighteen major Puranas, which are called the Mahapuranas. There are eighteen minor Puranas called the Upapuranas. The Puranas are voluminous. The Srimadbhagavata Mahapurana consists of eighteen thousand verses. The Puranas deal with five subjects: Sarga (creation of the universe), Pratisarga (dissolution of the universe), Vamsa (lineage), Manvantara (epochs), and Vamsanucarita (history). Most Hindus get their knowledge of Hinduism from the Puranas, which represent the popular form of Hinduism.

From the Vedas to the Puranas we have a complete record of the development of Hindu society. The Vedas provide the solid foundation on which the magnificent palace of Hinduism has been erected. However, the Vedas are so far removed from us, that we have only retained a memory of the Vedas providing our foundation and have completely forgotten what the Vedas really represent.

1.10: Meanings of the Vedas

The Rgveda on the face of it seems to be a book about cows, horses and other mundane matters without any kind of organization. Why will such a book be considered the book of all knowledge since time immemorial? Only explanation is that the Rgveda has a hidden meaning. The Rgveda clearly mentions that it has a secret meaning in following verse:

"The Vedic mantras are in the never-decaying remotest sky, where all the gods reside. One who does not know that, what will he do with the Vedic mantras? One who knows that, gods stay with him." Rgveda 1.164.39

The hidden names of the gods are mentioned in Rgveda 1.164.5,5.3.2,5.3.3,5.5.10, and 9.95.2. Thus it has always been understood that the Rgveda has a meaning very different from its • apparent meaning. As the loss of the Vedic science continued after the period of the Brahmanas, new meanings were given to the Vedas. There were two possibilities, either mantras could be altered to provide the new meaning or new meaning could be given to the words occurring in the mantras. Fortunately, mantras were not altered, rather commentators wrote volumes about what each word in each mantra meant. As there was no standard for doing this exercise, some words came to mean a multitude of things. For example the word "Gau" which means cow came to have 47 different meanings including rays of sun and milk. Ahi which means serpent is often translated as cloud. Mitra, Varuna, Savita, Aditya, Indra all came to mean sun, even though they have completely different meaning in the Rgveda. Indra is often described in the Rgveda as the one who created and placed sun in the heaven, still he was later identified with sun. As each word came to mean a multitude of things, any mantra could now be given hundreds of meaning. There are several translations of

the Vedas available currently, and one finds that for the same verse translations are as different as possible.

If we think about it, there is clearly a paradox here. Vedas are supposed to be so carefully compiled that even changing a letter was not allowed for thousands of years for the fear that its meaning will be lost, and on the other hand we are led to believe that our revered sages were so careless that they could not even use proper words. Why would the Vedic sages use the word for cow when they mean ray of light and the word for serpent when they mean cloud? In fact each word is very carefully thought and means exactly what it says. It is not the Vedic sage who declared that "Gau" means solar ray, but later day commentators, who had forgotten the meaning of mantras. In this book, we are going to discover an incredibly simpler picture. We will reduce the meaning of the Vedic mantras to exactly two: one what it literally says, that is the apparent meaning and other the scientific interpretation, that is the actual meaning. I will be quoting Vedic mantras very liberally, often I will be translating complete hymns. I have done so for several reasons. For one, I don't want to prove my point by selective quotation. Second, most educated Indians are very ignorant of what is in the Rgveda. This is a nice place to know a little bit more about the most sacred book of the Hindus and the first book of human race. Third and most important, what I have discovered is only the tip of the iceberg. I expect my learned readers to contribute in discovering the Vedas, and it is very important that I give my readers as much information as possible. The translation of the Vedic mantras in this book follows a very simple rule. I have tried to translate the mantras as close as possible to the apparent meaning, and then I have tried to explain its actual meaning. Thus I have translated Savita as Savita, Indra as Indra, Surya as Surya, Ahi as serpent, Gau as cow and so on. This is the most important point in rediscovering the Vedas. Unless the reader knows what exactly is the meaning of the mantras, the scientific meaning will elude the reader. For example a verse

from the Rgveda says the following:

"Indra created cows from serpent for Trita."   Rgveda 10.48.2

Satavalekara[2] translates it as "Indra created waters from cloud for Trita". This mantra does not make any sense unless the real meaning of cows and serpent are known, and therefore Gau (cow) received an additional meaning of water, and Ahi (serpent) received an additional meaning of cloud. In this book I will discuss the real meaning of Gau and Ahi, and then a great cosmic secret will be revealed by this mantra. Most translations of the Vedas differ from each other, because the translator is trying to put meaning in the mantras that are simply not there. The translations in this book are based on my own reading of the mantras in Sanskrit, and a number of books on the Vedas [2-7].

When actual meaning of the Vedas was forgotten, and several meanings were imposed on each word of the Vedas, it became easy to insert a lot of meaning to the Vedas that was simply not there. As none of these meanings justified the honor given to the Vedas, scholars started to believe that there were still more meanings hidden in the Vedas, and finally a tradition started that the Vedas contain all the knowledge that is there to acquire. This viewpoint is certainly wrong, as the Vedas have a certain number of mantras, and there is only a certain number of ways it can be interpreted. When new interpretations were given to the knowledge, most of the Vedas were explained as describing natural phenomena involving sun, cloud and rain. The cosmology of the Vedas was completely forgotten, and the fundamental particles and forces of nature were deified. The interaction of particles and forces was transformed into human history that went Bullions of years back in time. In the confusion that was created, it became easy for ideologically motivated historians to deny Hindus the most glorious epoch of Hinduism. Today the Vedas have returned in their pristine glory to clear all confusion,

and establish the reign of truth. One major problem in ascertaining the truth is to know when the Vedas were composed.

1.11: Dating of the Vedas

Tradition believes that the Vedas are as old as the universe itself, and many Vedic scholars still try to adhere to this position. This viewpoint is clearly wrong, and arises from the confusion between when the Vedas were written and what is in the Vedas. The knowledge contained in the Vedas is as old as the universe because the Vedas are about the evolution of the universe, while the Vedas have been discovered only very recently. The Vedas do not give any clue as to when they were written, so scholars have resorted to other methods in determining the age of the Vedas.

One of the most illogical method was adopted by Max Muller, famous Vedic scholar of last century, and regrettably it is the most popular up till now. Max Muller believed in the Biblical creation, and calculated the age of the Vedas as follows[8]. He assumed the creation to have taken place on October 23, 4004 B.C., and then using the biblical chronology deluge is placed in the year 2448 B.C. He granted a thousand years for the floods to subside, thus arriving at 1400 B.C. for the Aryan invasion of India. He allowed 200 years as the time to get familiar with the new home, thus calculating 1200 B.C. as the date for the composition of the Vedas. Of course, he did not provide this reasoning for his dating of the Vedas to general public, but worked backwards to give the same chronology he had already calculated. He fixed 600 B.C. for the date of Buddha, allotted 200 years each for Chandas, Mantra and Brahmana period. Thus the Brahmanas were composed during 800-600 B.C., Mantra portion of the Vedas composed during 1000-800 B.C. and Chandas portion of the Vedas (e.g. Rgveda) was composed during 1200-1000 B.C. Obviously there is no scientific reason as to why it should take only 200

years each and not 500 or 1000 years for the composition of Chandas, Mantras and Brahmanas. Later Max Muller disowned his chronology and said that no power on earth can determine when the Vedas were written.

Tilak and Jacobi resorted to astronomical dating of the Vedas. They interpreted few verses of the Rgveda to come to the conclusion that these verses describe the time period of 4500 B.C. This method is also highly questionable. There is no indication in the Rgveda to suggest that it is a book of astronomy, and the few verses that have been interpreted to contain astronomical information are highly mystical. The astronomical information is arrived by assuming meanings of the words very different from the apparent meanings, and remains entirely unconvincing. For example in his book Orion, Tilak interprets Rbhus to mean seasons, Vasta (he-goat) to mean sun and hound to mean Canis Major in Rgveda 1.161.13. These meanings can only be considered to be imposed on the verse. Tilak uses a verse from Gita in which Lord Krsna says that he is Margasirsa among the months and spring among the seasons. Tilak considers this verse to contain the memory of those days when Margasirsa used to fall during spring about 10,000 years ago. Again, this is not a logical argument. The two statements about months and seasons are completely independent and there is no reason to see a connection there. Thus astronomical dating of the Vedas stands on very shaky grounds.

Some other scholars have tried to prove the antiquity of the Vedas by performing geological dating. Rgveda 10.136.5 talks about seas in the east and west, which can not be applied to the area where the Vedas are supposed to have been composed. A. C. Das in his book Rgvedic India[9] takes the antiquity of the Vedas to beyond 25,000 years in order to justify the verses like this. As the reader will see in this book, the Rgveda is a coded book, and the rivers, mountains and seas of the Rgveda do not refer to these objects at all. Thus geological dating of the Vedas

is a futile exercise.

How are we then to know about the time when the Vedas were composed? Fortunately, there is a very simple way of dating the Vedas. We should remember that the Vedas did not exist by themselves, but the book that is considered so sacred in India, must have been lived by the people. Their lifestyle and belief system will show a clear mark of the Vedas. If we could find those people, then we will know the date of the Vedas. Hinduism is a dynamic religion, which has changed its form with the passage of time. We can date our scriptures by matching them with the archaeological artifacts. As I tried to do this exercise for the Rgveda, I found a striking match with the Indus Valley Civilization. This is only to be expected. The Rgveda is the oldest of our scriptures and the Indus Valley Civilization is the oldest age of Indian civilization, therefore it is no surprise that they match each other. We will see in this book that the Indus Valley seals represent Vedic ideas, thus proving without doubt that this civilization was Vedic civilization and the Rgveda was written at the beginning of this civilization. This gives a date of 3000 B. C. for the composition of the Rgveda.

1.12: Commentators of the Vedas

The first commentator of the Vedas is Yaska. By his time scientific meaning of the Vedas was mostly lost, and Hindus were looking at the Vedas with suspicion. Atheist Carvakas considered the Vedas inane and meaningless. Yaska describes the criticisms by Kautsa in Nirukta 1.15. Kautsa claimed that the Vedas are meaningless, because neither the order of words can be changed nor a word can be replaced with another word of same meaning. Kautsa also gave the example of the dialogue with inanimate objects, and said that this could be composed by mentally ill people only. He considered the Vedas meaningless also because

several mantras contradict each other, like sometimes one Rudra is mentioned and sometimes thousand Rudras are mentioned.

These criticisms are valid when actual meaning of the Vedas is not known. We are indeed fortunate that the Vedas have still come to us as intended, and the contribution of the Brahmanas in preserving the Vedas can not be underestimated. Brahmanas were supposed to protect the Vedas, and they have performed their job very well. Most famous commentator of the Vedas is Sayana. His commentary has been the basis of western scholars of the Vedas. Uvvata and Mahidhara have also written commentaries on the Vedas. Prominent commentators among western scholars are Roth and Maxmuller. Among recent Indian scholars, the commentaries of Dayananda, Aurobindo and Satavalekara are prominent. Dayananda considered the Vedas to be the books of all fields of knowledge, and he has written his commentaries to prove this point. Aurobindo has given a psychological interpretation of the Vedas. Satavalekara follows the line of thinking of Dayananda to certain extent. Despite all these attempts, the meaning of the Vedas has eluded mankind so far, because none of them have shown the existence of an extraordinary knowledge in the Vedas, which will justify the honor given to the Vedas since their discovery. This book is the first serious attempt in decoding that extra-ordinary meaning of the Vedas, and once the reader has finished this book, the reader will know the reason for the failure of earlier commentators. The physics that the Vedas talk about has not been discovered yet, and it is only now that modern physics has given humanity a foundation to launch an attempt to understand the Vedas. In fact knowledge of the Vedas was targeted for us, for what purpose, I do not know. It is a gift to humanity from the ancestors of antiquity, who have been maligned as invaders and barbarians, but they had only love for their descendents, and the Vedas are the testimony of that love.

The Vedas have guided Indian civilization for the last five

thousand years. The Vedas are the pillars of Hinduism. Hinduism has evolved from the Vedas, but the current popular form of Hinduism is very different from that in the Vedic period. Most Hindus know about Hinduism from popular epics Ramayana and Mahabharata, and from Puranas. Hinduism has changed in form so much from the Vedic period that modern historians have argued about the Indus Valley Civilization being non-Hindu, and educated Hindus have accepted it. In fact, there is simply nothing in the Indus Valley Civilization that is not part of Hinduism. The people of the Indus Valley Civilization were representing the knowledge of the Vedas in various forms. The Vedas formed the very basis of that civilization, which the Vedic people are accused of destroying. This accusation could gain any ground, because the physics of the Vedas was completely forgotten. In this book, we will discover the lost physics of the Vedas after thousands of years, and start the process of interpretation of the so-far undeciphered Indus Valley seals.

"I cannot deny the feeling of unreality in writing about the first three minutes as if we really know what we are talking about."
- Steven Weinberg

2. The Time Before Time

You are about to set forth on a journey like the one you have never taken before. You are about to see things that you have never even suspected to exist. You are about to confront the wisdom from beyond. Your journey into the fascinating realm of Vedic wisdom will take you billions of years in past to a time when even time did not exist.

2.1: The Golden Womb

Imagine yourself going backward in time all the way to the first moment, when universe came into existence with the expansion of the universe. What was there before this moment of creation?

"Before creation there existed golden womb, he was the only lord of everything born. He holds earth and this heaven."

Rgveda 10.121.1

The creation is only a manifestation of the supreme being. Before creation the supreme being existed in an unmanifested form. This form is called the golden womb, a womb because the whole universe originated from it. Why is the womb considered golden? Gold has a special color. Materials turn golden at very high temperature. The womb from which sun, stars and galaxies are formed, golden is an appropriate adjective for that. Gold is thus the color of energy in Vedic literature. The association of gods with gold in Hindu Dharma is a symbolic representation of gods being various forms of energy. The idols of gods have always been adorned by gold for this reason, and this is the reason for the excessive attachment of Hindus with gold. At one time India was called the golden sparrow, because Indians had accumulated vast quantities of gold during thousands of years of civilization and it was the richest country in the world. The legends of its riches were spread in faraway places, and voyagers were so fascinated with India that wherever they landed, they called the native inhabitants Indians. The state of being before the creation is described with precision in the Nasadiya hymn of the Rgveda.

Rgveda 10.129

Sage: Prajapati Paramesthi; Deity: Bhavavrtta; Metre: Tristupa

1. There was neither manifested nor unmanifested. Then there was no dust and there was no sky beyond that. What was covering, where was whose shelter? What was the deep, inexplicable sound?
2. There was neither death nor immortality. There was no differentiation between night and day. Only he was there by his own will without air. There was nothing beyond him.
3. Earlier there was darkness, everything was enveloped in

darkness. All this was undifferentiated fluid (Salila). Whatever was, was covered in emptiness. That one was born from heat.

4. Earlier (before creation) desire (to create) arose in him, then from his mind first seed was born. Wise men by reasoning found the manifested bonded to unmanifested.

5. Its rays spread oblique, down and up. He became the begetter. He became great by his own will below and beyond.

6. Who knows, who will tell here that from where and why this creation was born, because gods were born after the moment of creation. Therefore, who knows from whom this was born.

7. From whom this creation was born, he upholds this or not. Its lord who resides in the remotest sky, may be he knows or may be even he does not.

The state of being before the creation was way beyond we can comprehend by senses. There was emptiness, and everything we can observe was not there. There was neither space nor time. There was neither matter nor energy. This is a very important concept in the Vedic cosmology. Modern physics tells us that all the matter and energy of the universe was concentrated in a point, while verses one to three clearly emphasize that the Vedas consider the universe to be completely empty in the beginning. The Taittiriya Brahmana says:

"Earlier there was absolutely nothing. There was no heaven, no earth and no atmosphere." Taittiriya Brahmana 2.2.9.1

This has very important consequences for the evolution of the universe as we will see. Modern physics tells us that the universe started infinitely hot, which cooled down rapidly with the expansion of the universe. Vedas tell us the opposite. Universe was extremely cold in the beginning. The evolution of the universe started with the rise in temperature. In verse three, the cause of the universe is said to be tapa. Tapa is a very important concept

in Hinduism. In post-Vedic Hinduism, Tapa comes to mean the performance of austerity in deep forests, the result of which could be the gain of immense power. Tapa means to heat, to warm up, and it is in this sense that tapa is used in the Vedas. The evolution of universe started with the creation of matter, energy and space, the effect of which was to warm up the universe. In this way whole universe could be considered to be born out of Tapa.

2.2: Water Everywhere

There was complete darkness earlier and all that existed was Salila (Rgveda 10.129.3 quoted above). Salila means water, but in the Rgveda it is a technical term which means undifferentiated primordial fluid. In the verse Salila is preceded by the adjective "apraketa" meaning undifferentiated, which leaves no doubt about its intended meaning. The Rgveda is a book of ancient cosmology, which uses common words known to the Indus Valley people, so that everyone could understand the most abstruse concepts. For us, who are far removed in time from those people, the Vedas are the only guide to understand their way of life. This is not an easy task, because the real meaning of the Vedas is very different from the apparent meaning. We have to pick up each word, try to decipher its meaning, and then see whether it fits in the framework of the Vedas. That "Salila" is a technical word in the Vedas is clearly confirmed by a mantra from the Satapatha Bralimana. Mantra 11.1.6.1 says that Apah were indeed Salila earlier. Now Apah and Salila both mean water. If water is the intended meaning then this verse will make no sense at all. Clearly both Apah and Salila are technical terms, and can not be used interchangeably. We can think of words "speed" and "velocity" which in the ordinary usage are equivalent, but in Physics their meanings are very different, one being a scalar quantity and the other a vector. Salila is the primordial state of the universe, when there is nothing

manifest. There is complete equilibrium and homogeneity. When this equilibrium is broken due to the action of the fundamental forces of nature, inhomogeneity is created, and this inhomogeneous state is termed Apah**.**

The Vedas tell us that in the beginning everything was Salila, whose apparent meaning is that there was water everywhere. This concept of water being everywhere was spread all over the world and was later borrowed by other religions. The Bible (Genesis 1.1 -2 and 1.6-7) and The Koran (21.30) say that in the beginning the universe consisted of water only. A description of the myths of Quiches, the native Indians of South America, is found in Popol Vuh. Quiches believed that in the beginning there was nothing but water and the feathered serpent[1]. The message of the Vedas was spread far and away, and Vedic science had given rise to many popular myths.

2.3: Deluge that Never Came

Another widespread belief of the ancient world is that of a deluge. It is really strange that the whole world believed in a deluge, when such a deluge had not come during the last ten thousand years. How could humans have a memory of a deluge that must have come before ten millennia if at all, while the history of civilization is of a more recent origin. Only logical answer is that it is part of a popular myth confused with reality. The cause of this confusion is the use of words Salila and Apah in Vedic science. The Vedas use Salila to denote the primordial undifferentiated fluid, the confusion of which with water gave rise to the story of watery origins. Apah denotes the inhomogeneous state of the universe. Apah also means water, and this water formed the basis of deluge stories. The story of deluge is not found in the Vedas. The oldest version of deluge is found in the Satapatha Brahmana **1.8.1.1-6.** One day Manu, son of Vivasvana held a little water in

his hand to clean his mouth. A very small fish was caught in his hand. The fish said that nourish it and it would protect him. Manu asked how the fish would protect him? The fish said that in a few days a deluge would destroy everything and it would protect him from that. Manu asked how he could protect the fish. The fish said that put it in a pot, then in a pit, and then in ocean. The fish told Manu the time of the deluge and to be ready with a boat. When the flood came, Manu rode in the boat. The fish came to him as a huge fish with one horn. Manu tied the boat with a rope to the horn of the fish. The fish took him to a mountain, and told to stay there till the flood subsided. This story transforms in the incarnation of Lord Visnu as a fish in the Puranas.

Myth of such a deluge was prevalent among the tribes of North American Indians as well. George Catlin, a nineteenth century traveler, who lived among native Indians, tells us about the deluge myth among a tribe near west bank of Missouri in USA[2]. Mandans believed that the human race was destroyed by the rising of the waters. Only one man survived the deluge, who landed his big canoe on a high mountain. All human beings have descended from that man. Peruvians also believed in a deluge myth[3]. Only one man and a woman survived the deluge. They floated in a box to a place several hundred miles from Cuzco. They settled there on the order of creator. The Bible tells the story of deluge in Genesis 6.1 to 8.22. Cosmology of Semitic religions is a direct borrowing from the Vedas.

2.4: Creator

Verse 10.129.4 tells us that the universe was created by the desire of the Supreme being. This is in complete contrast with modern physics. Modern science tells us that evolution of the universe is a random phenomenon. It does not tell us why an infinitely complex structure like human being has evolved, because

randomness can only increase the disorder in the universe.

Verse 10.129.5 tells that once the process of creation began, Supreme being became great, meaning universe started to expand. In the Vedas universe is not considered different from Supreme being. Expansion of the universe is a key feature of Vedic cosmology and is in agreement with modern science, but there are very significant differences as well, and the aim of this book is to highlight those differences. A common complain against scientific interpretation of Hindu scriptures is that why do these interpretations come up only after the discovery of scientific facts? Is there anything in the scriptures, which can be told before its scientific discovery? In this book I am going to do exactly that. At every stage I will highlight the differences, and these differences are not minute by any stretch of imagination. It is up to the scientists to prove that the Rgveda is wrong. If the Rgveda is a product of primitive people engaged in agriculture and husbandry, then if should not take even minutes to prove that this scientific interpretation is wrong. In fact, a book detailing the science of those ancient people can not even be attempted. One can also say that this whole science is the product of author, and that it does not exist in the Vedas. To refute this claim, I will quote extensively from the scriptures, pick up the words from mantras, and dissect those words to reveal the meaning behind. Soon it will become clear that we are not dealing with primitive minds, but minds who had the capability to look inside atoms on one hand, and to observe the boundaries of the universe on the other hand.

Verse 10.129.7 states that the supreme being resides in "Parama Vyoma". Vyoma means sky or space, and parama means remotest. Thus Supreme being exists beyond our senses of space and time, and this is the state about which wise sages talk about during the moments of realization of truth. It will seem paradoxical, that on one hand the Vedas do not consider Supreme being to the different from the universe, and still talk about him

as being beyond our senses. This is so because what we normally observe is only the manifestation at a gross scale, while the ultimate realization of this concept can only occur at a very subtle scale well beyond our scientific capabilities. Let's then proceed to see in more detail what the Rgveda tells about the supreme being in the most important hymn of the Vedas, the Purusa hymn.

"I dwell within all beings as the soul, the pure consciousness, the ground of all phenomena, internal and external. I am both the enjoyer and that which is enjoyed. In the days of my ignorance, I used to think of these as being separate from myself. Now I know that I am all."

- Sankaracarya

3. All this is Purusa

The Purusa hymn is considered the most important hymn in the Rgveda. The importance of the Purusa hymn is obvious from the fact that this is the only hymn available in all four Vedas. Vedavyasa has said in Mahabharata, Santi Parva, 338.5 that the Purusa hymn is the most important hymn in the Vedas. This is a very important point to remember that while Indian tradition considers the Purusa hymn to be the most important hymn, western scholarship considers the Purusa hymn to represent a savage myth. Western scholarship thus concludes that the Purusa hymn is a very old hymn in the Vedas, while the Nasadiya hymn, which is very profound, is considered to be of a very late origin. We will soon see the absurdity of this viewpoint. Remember, India can be understood only from an Indian point of view, because

it has a unique history. The Purusa hymn is the key to understanding the Vedas. In the Rgveda, the Purusa hymn consists of 16 verses, in other Vedas it consists of up to 22 verses.

In the Rgveda, "Purusa" word is used fourteen times, out of which nine times it has been used in the Purusa hymn itself. Purusa means man, but this is not the intended meaning in the Vedas. To understand the meaning of the Vedas, we have to find the etymological meaning of each word in the Vedas. Purusa etymologically means one who is pervading the town (Pura) or one who is sleeping in town. Pura itself means one which guards and nourishes. Here it is important to note that Pura is no ordinary town. The whole cosmos is considered the town, and the supreme being who pervades the cosmos is Purusa. Thus Purusa in the Vedas stands for God, and this is the way Purusa has been described in all scriptures and commentaries following the Vedas. Satapatha Brahmana 7.4.1.15 and Jaiminlya Brahmana 2.47 equate Purusa with creator Prajapati. As this is the most important hymn of the Vedas, we will follow each verse of the Purusa hymn of the Rgveda in order to understand the meaning of the Vedas and the seals belonging to the Indus Valley Civilization.

3.1: The Purusa Hymn

Rgveda 10.90 Sage:
Narayana; Deity: Purusa; Metre:
Anustupa, 16 - Tristupa

"Purusa has thousand heads, thousand eyes and thousand legs. He is covering Bhumi from all around, and is beyond also in ten-finger form." Rgveda 10.90.1

Bhumi means land and here it is used to denote the universe. Thousand is used in the sense of infinite. The most crucial point

in this verse is that the Purusa exists outside the universe in ten-finger form. The Vedas are full of numbers like three, seven, and ten. A careful reading of the Vedas will reveal that these numbers do not occur at random as will be the case if the Vedas were a poetry of pastoral people. There is a consistency about these numbers. What could ten-finger form represent? Could it represent ten dimensions? Yaska says that directions are hand of nature in Nirukta 1.7. Taittiriya Samhita 4.7.9.1 says that fingers are directions. The Satapatha Brahmana (6.3.1.21 and 8.4.2.13) tells that directions (Disa) are ten. In modern scientific terminology direction will mean dimension. Thus we have compelling evidence of universe being considered ten-dimensional in Vedic cosmology. In the Vedic cosmology the universe has a boundary which is obvious from the word "beyond" in this verse. Vayu Purana 4.74-75 tells us that the whole universe including moon, sun, galaxies and planets was inside the egg and the egg was surrounded by ten qualities from outside. Vedic commentator Sayana also considers "dasangula" to represent outside of the universe. This verse then tells us that outside of the universe is ten-dimensional. "Ten fingers" is not an isolated occurrence in the Vedas. Ten fingers extracting the juice of Soma is a recurring theme in the Rgveda (for example 9.46.6). It is also important to note that the same phenomenon has been described in various ways in the Rgveda. The aim is to make sure that important messages are not overlooked. So these ten fingers become ten women in Rgveda 9.56.3, where it is said that ten women call Soma to come to them. The Vedas are the source of many of our beliefs. When Hindus go to a foreign land, it is said that they have gone across seven seas. Now the number of seas on our earth is not seven. This belief has its origin in "Sapta-sindhu" meaning seven rivers or seas of Rgveda. The seven seas of the Rgveda have nothing to do with rivers or seas. Similarly Hindus still refer to forty nine winds. These forty nine winds have the origin in the ferry nine Manilas of the Rgveda, because Maruta

means wind. However, Maruta has nothing to do with wind in the Rgveda. Hindus have the concept of ten directions. These ten directions are described as north, east, south, west, north-east, north-west, south-west, south-east, up and down. Obviously the counting of north-east, north-west, south-west and south-east as separate directions does not make sense at all. This is because the concept of ten directions has its origin in ten dimensions of Vedic physics, and when this knowledge was lost, Hindu intellectuals came up with the above explanation. Post-vedic Indian literature is full of such explanations of Vedic knowledge, which do not make sense at all. There was little choice left to post-vedic Indian intellectuals, as the Vedic verses were becoming hard to comprehend. Vedic science was being gradually forgotten, and in order to preserve the invaluable Vedic wisdom, some kind of explanation was necessary. Brahmanas have done the humanity a great service by preserving the Vedas against all odds. Today in the light of modern physics we can start the process of deciphering the Vedas.

"All this is Purusa, whatever has happened and whatever will happen. He is the lord of immortality, who increases by food."

Rgveda 10.90.2

This verse is the origin of the Vedantic philosophy. Chandogya Upanisad 3.14.1 says that all this is Brahma indeed. As everything in the universe is a manifestation of the Purusa, we are also part of the supreme being. Hindu scriptures tell that when we realize the true nature of self, then there remains no difference between us and God. This realization is reflected in Brhadaranyaka Upanisad 1.4.10, which says that I am Brahma. Purusa is not different from the universe. Universe is only a manifestation of him. This is why Hindus did not develop a dichotomy between good and evil as in other religions. There is no concept of eternal hell in Hinduism, because even hell can not be separated from

the God. In fact, there is no concept of hell or heaven after the end of universe. Universe is only a manifestation of the supreme being, and at the end of present cycle of the universe called "Mahapralaya" everything goes back into the Purusa. After the end of the universe, there is no heaven, there is no hell, and there are no souls.

The second part of the verse is very significant. It tells that the Purusa is growing by food (Anna). Purusa also means a man. As a boy grows by food, the universe is growing by Anna. Obviously, this is no ordinary food (Anna). This food is the stuff that the universe is made of. Thus "Anna" can be identified by the matter-energy of the universe. The expansion of the universe is a key point of the Vedic science, and is referred to again and again in the Vedas.

"Such is his glory, there is an even greater Purusa. All that is born, is his one fourth, his three fourth is immortal in heaven."

Rgveda 10.90.3

The division of the universe in the earth and the heaven is the central thesis of the Vedic science. One fourth of the universe is in the earth and three fourth of the universe is in the heaven. This may look very unscientific, because the earth is negligibly small compared to the heaven. By no stretch of imagination the earth can hold one fourth of the universe. However, I would remind my learned reader that knowledge of the Vedas is coded. Nothing in the Vedas means what it appears to mean. Once you understand the scientific meaning of the earth and the heaven, this verse will reveal a great cosmic secret. The meaning of the earth and the heaven will be discussed in detail in a later chapter. For those readers, who cannot hold their curiosity, there is a glossary at the end of the book, which lists the apparent meaning and scientific meaning of important technical terms used in the Vedas. I request the reader to frequently consult the glossary, whenever in doubt.

"Three-fourth of the Purusa is above, his one fourth is born again and again. Then he covered them all, those who eat, and those who don't." Rgveda 10.90.4

This verse reinforces the ideas of the previous verse, so that there is no confusion about its meaning. One fourth of the Purusa is in the earth and is born repeatedly, while three fourth of the Purusa is in the heaven, where there is neither birth nor death. Earlier food (Anna) was identified by matter and energy of the universe, so eating refers to the transformation of matter into energy.

"Then Virata was born. Virata is greater Purusa. He began dividing after being born. Then Bhumi and Pura became."

Rgveda 10.90.5

When the universe starts to expand, it is given the name Virata meaning extremely big. The expansion of the universe is accompanied by its division into the earth and the heaven. Bhumi refers to earth and Pura to the boundary of universe. Pura means a fortified town and is also used in the sense of fort surrounding the town. This concept is a very important one, as this will help unravel the meaning of the mightiest Vedic God, Indra, also called Purandara meaning one who breaks the fortified towns.

"When Gods started Yajna by oblation of Purusa, spring was its butter, summer was fuel and winter was oblation."

Rgveda 10.90.6

"That Purusa, who was born earlier, was sprinkled by sacrificial grass. Gods, Sadhyas and sages started the Yajna by Purusa."

Rgveda 10.90.7

These two verses talk about Yajna, which is normally translated as sacrificial ceremony. The Purusa himself was sacrificed in this Yajna. Yajna is a very important concept in Hinduism. Yajna refers to the creation of matter, energy and space, none of which existed before the creation. My knowledgeable readers will object to this statement saying that matter and energy have always existed, and all the matter and energy of the entire universe was concentrated in a point before the Big Bang. This is not the Vedic concept and I will argue in greater detail later in this book during the discussion of the Vedic cosmology that the universe did not start with a Big Bang. The Vedas are very clear about the universe emerging from a void, and this is the basis of saying "Sunya hi Paramesvara hai" meaning Void is God indeed.

As the universe had no matter, energy and space to begin with, the creation of these is obviously most important for the universe. As Yajna is the creation of the stuff universe is made of, it is no wonder that the Vedic sages do not get tired of describing the importance of Yajna. They declare that Yajna is the navel of the universe, meaning universe exists because of Yajna. Satapatha Brahmana 14.3.2.1 declares that Yajna is the soul of all these beings.

"From that Yajna of entire offering coagulated butter (or butter mixed with curd) was obtained. Vayavya, Aranya and Gramya animals (Pasu) were made." Rgveda 10.90.8

As Yajna proceeded, that is the creation of the matter, energy and space proceeded, the earlier homogeneous state became inhomogeneous. This inhomogeneity is represented by coagulated butter. The universe was no longer same everywhere. It separated into matter and energy. Matter particles were given the name animals, and divided in three categories: Gramya meaning those living in villages, Aranya meaning wild animals, and Vayavya meaning birds.

"From that Yajna of entire offering Rchas, Samas were born. From that metres (Chandas) were born, from that Yaju was born."

Rgveda 10.90.9

This verse is traditionally quoted to prove the origin of the Rgveda, the Samaveda, the Yajurveda, and the Atharvaveda from the God. The Atharvaveda is not explicitly mentioned and commonly Chanda is identified with the Atharvaveda to prove the divine origin of the Atharvaveda. Of all four Vedas, the Rgveda is considered the most sacred, and even other Vedas get their recognition of being divine by this verse in the Rgveda itself.

"From that horses were born, who have teeth on both sides. From that cows were born, from that goats and sheeps were born."

Rgveda 10.90.10

This verse sheds more light on Gramya animals described earlier. Four Gramya animals are listed here: horse, cow, goat and sheep. Vayavya and Aranya animals are not listed.

"The Purusa described here, how many ways has he been imagined? What (is) his mouth, what (are) both hands, what are called thighs and both legs?" Rgveda 10.90.11

"Brahmana was his mouth, Rajanya was made hands, his thighs (are) those that (are) Vaisya, for both legs Sudra is born."

Rgveda 10.90.12

"From his mind moon was born, from his eyes sun was born. From his mouth Indra and fire (Agni) were born. From life-breath air (Vayu) was born." Rgveda 10.90.I3

"Atmosphere was from navel, from head came heaven. From both legs land, from ears directions (came), similarly worlds are imagined." Rgveda 10.90.14

These four verses are figurative, and describe the society and cosmos as various parts of the supreme being. The idea of the God as a human being is described in a poetic way in these verses. These verses form the basis of the idea of the God making man in his own image in Semitic religions.

"Seven were its enclosures (Paridhi), three times seven were made firelogs (Samidha). In the Yajna, which gods were expanding, they sacrificed the Purusa-animal." Rgveda 10.90.15

This verse can be considered the key to understanding the Vedas. It contains the sacred numbers three and seven, both of which are encountered again and again in the Vedas. Three refers to the three Lokas, earth (Prthivi), atmosphere (Antariksa) and Heaven (Dyau). Each loka contains seven firelogs making the total twenty one.

What does the sacrifice of Purusa-animal mean? How can the God himself be sacrificed? The sacrifice here means a change of form, a change from unmanifested form to a form of manifested universe. This change of form is described in a verse in the Atharvaveda:

"Earlier he had no legs, he gave rise to Svah. He then became four-legged and consumable, later he ate all the food."

Atharvaveda 10.8.21

When the Purusa is formless, he has no legs, when he takes form, he becomes legged. The consumption here represents the annihilation of particles into energy. At the end of the universe neither matter nor energy exists, which is represented as Purusa

having eaten all the food. As the Purusa ceased to be what the Purusa was before the creation, he was symbolically sacrificed. This had nothing to do with human sacrifice.

"Gods started the Yajna from Yajiia, those were the first Dharmas. Those glorious ones attain heaven, where earlier celestial beings and gods are." Rgveda 10.90.16

Once the process of creation has started, it continued by itself. Vedic sages were worshippers of knowledge. They wanted their descendents to continue that tradition. Therefore they promised union with gods for those, who knew the process of creation.

3.2: Man in the Image of God

As the Purusa hymn is the most important hymn in the Rgveda, and the Rgveda was considered the most sacred knowledge by the inhabitants of the Indus Valley Civilization, it is natural to expect that the knowledge of the Purusa hymn would be reflected in their culture. Figure 3.1 shows the human figurine found at Mohenjo-daro in the Indus Valley. This has been called priest-king by Marshall, which is pure speculation. I will identify this with Purusa. First, this figure is indeed of a man, and Purusa means man. Second, the man is shown wearing a garment with three intersecting circles. These three intersecting circles represent the intertwined three lokas (spaces) resulting from the two-fold division. The division of the universe in three spaces is discussed in detail in the sixth chapter. Vedic ideas were spread all over the world during the dawn of human civilization. Later the origin of these ideas was forgotten, but the ideas were incorporated in the religions that came later. Depiction of God as man (Purusa) in Rgveda is the basis of the belief in Semitic religions that man has been created in the image of God (The Bible, Genesis U7)



Figure 3.1: Purusa, a statue from Mohenjo-daro (DK 1909)

3.3: Secret of the Unicorn

One of the most puzzling aspect of the Indus Valley Civilization is the depiction of unicorn on the seals. There is no animal in the world that resembles the unicorn. Some historians have tried to explain it as a representation of rhinoceros, but there is no similarity at all between a rhinoceros and the unicorn of the Indus Valley Civilization. Figure 3.2 shows the famous unicorn motif of the Indus Valley Civilization. This is the motif of more than half of the seals found, so this is the central point of the belief of the Indus people. This also happens to be the representation of the fifteenth verse of the Purusa hymn. The figure shows the sacrifice of the Purusa animal. In the verse Purusa is described as an animal, and so the seals represent the Purusa as an animal. But the Purusa is no ordinary animal, he is one lord of the whole universe. This oneness is represented by the one horn of the animal. A unicorn was also chosen to make the clear distinction that it does not represent an actual animal sacrifice, but is a symbolic one. The object in front of the unicorn is described in literature either as a mysterious object or a melange. It can not be a melange as the mouth of the unicorn is almost always facing away from the object. This object represents a Vadhyasila, a sacrificing stone on which the neck of sacrificed animal is put for slaughtering. The animal will obviously in such a situation look away from the stone. In some seals with this motif even few drops are visible, which would represent the blood coming out of sacrifice. The most important fact is that there is a direct correlation between the importance of the Purusa in the Vedas and the frequency of occurrence of the seals with the unicorn motif.

The Purusa hymn is the most important hymn of the Vedas as attested by its occurrence in all four Vedas and description of its importance in post-vedic scriptures. That there is only one hymn dedicated to the Purusa in the Rgveda does not lessen the

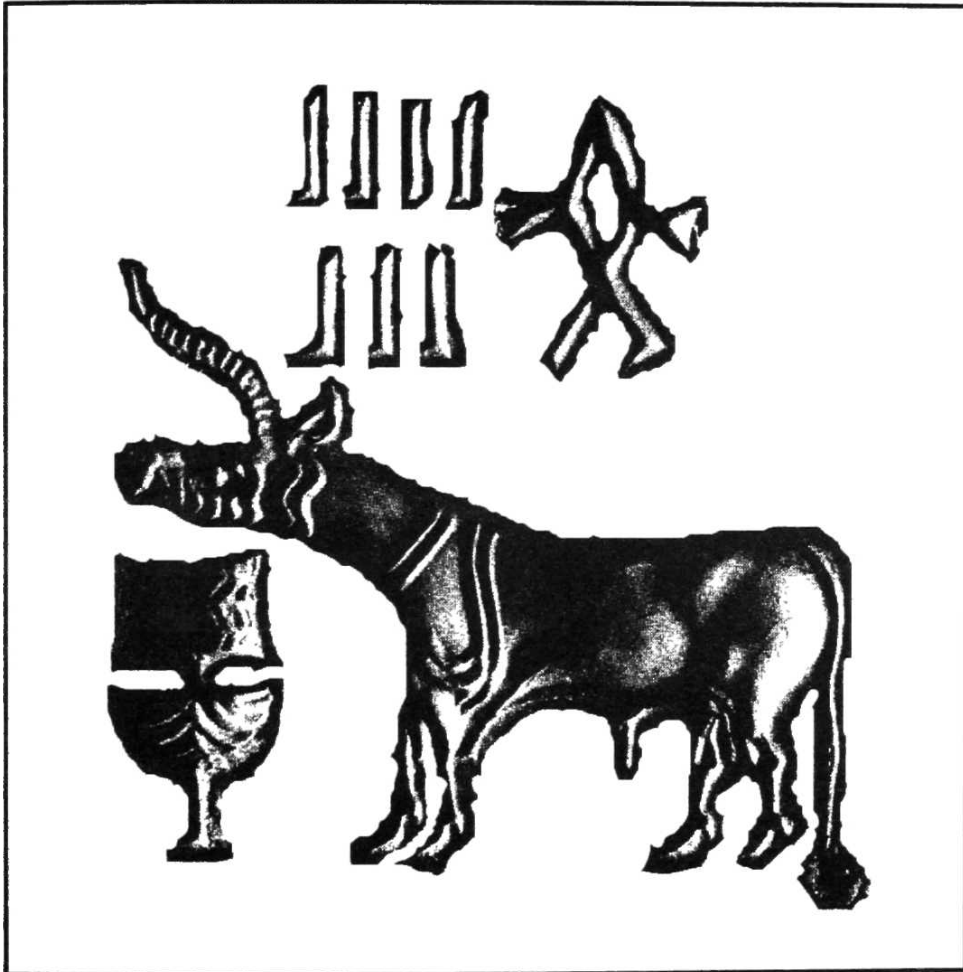


Figure 3.2: Sacrifice of Purusa Animal, an Indus seal from Harappa (H-9)

importance of the Purusa, because in the Rgveda all numbers are carefully selected. There is only one hymn dedicated to the Purusa because there is only one Purusa. The unicorn motif is the most frequently depicted motif on the Indus seals, because it represents the sacrifice of the Purusa animal. This at once proves that the Indus Valley Civilization was Vedic Civilization.

3.4: Purusa Sacrifice

As the Purusa hymn is the most important hymn of the Vedas, and knowledge of the Vedas was spread all over the world by ancient Indians, it is only to be expected that the myths related to the Purusa sacrifice would be found all round the globe. In Egypt, corpse of Osiris was torn in fourteen pieces and scattered all over. Various natural objects formed from these pieces. In Greek mythology, Dionysus Zagreus was chopped into pieces by titans. In the Norse myths, giant Ymir is torn into pieces. Earth forms from his flesh, sea and waters from his blood, mountains from his bones, rocks from his teeth, plants from his hair, sky from his head and clouds from his brain. Among Chaldeans, Omorca is cut in two pieces and two halves of her body become heaven and earth.

Among the Tinnehs, native Indian tribes of Canada, a giant tears apart a handsome young man. From the fragments thrown into the rivers fishes were born and from the fragments thrown into air birds were born[l]. Among Iroquois of North America, limbs, bones and blood of giant Chokanipok form natural objects.

3.5: The Concept of Paradise

Paradise is formed from the word Pairy-Diz meaning enclosure in the Avesta, an Iranian scripture having close resemblance to

the Vedas. Pairy-Diz in turn is the deformation of Paridhi and has same meaning. As in the Purusa hymn, Pairy-Diz is also seven in die Avesta. This has given rise to the concept of seven tiers in the heaven. The Koran talks of seven heavens in 2.29,67.3 and 71 15

3.6: Prajapati

In the age of Brahmanas concept of the Purusa was replaced by that of the Prajapati. The Satapatha Brahmana says:

Apah were indeed Salila earlier. Desire arose in it. They labored. From that heat arose. From heat golden egg was born. Golden egg was swimming in that for a year. After that year Purusa was born. He is Prajapati." Satapatha Brahmana 11.1.6.1-2

In this mantra the Purusa is equated with the Prajapati. In post-vedic scriptures the Prajapati is the creator of the universe. We also see an important difference. The Purusa is shown as being born after the creation of the golden egg, which is clearly against what we have seen earlier in the Rgveda. The Satapatha Brahmana is invaluable in our quest to find the meaning of the Vedas, but at the same time we have to be very careful in our attempt, because there is a clear sign of the loss of the Vedic science. The Brahmanas are very clear about this themselves. After the Mahabharata war, the Vedas started to become incomprehensible due to the loss of the Vedic knowledge base. The Sages feared that soon the Vedas will become completely incomprehensible, and therefore they started to write the Brahmanas, the commentaries on the Vedas. As such the Brahmanas represent a significant deviation from the Vedas, and several centuries must have passed between the Mahabharata war and the writing of the Brahmanas.

In the Satapatha Brahmana, the Prajapati wants to cohabit with his daughter. She feels outraged and becomes a cow. The Prajapati becomes a bull and cohabits with her. She keeps changing in to various animals, and the Prajapati also keeps changing in to corresponding male animals. Thus various animals are born due to their cohabitation. There is a parallel Greek legend to this, in which Zeus takes the form of various animals. Persephone takes the form of a serpent and Zeus becomes a male dragon to cohabit with her. Similarly, Zeus took various animal forms of swan, eagle and dove in his amorous adventures. To woo the daughter of Cletor he became an ant. As these adventures are not found in Vedas, it stands to reason that the Greeks did not borrow these ideas from the Vedas, but from the Brahmanas. This is only logical, because the Indus Valley Civilization is the Vedic civilization and predates Greek civilization by two millennia. The Greek civilization came into existence after the writing of the major Brahmanas.

The Purusa hymn is the most important hymn of the Vedas, and the key to understanding the Vedic cosmology and the Indus Valley Civilization, therefore we will keep returning to the Purusa hymn throughout this book to unlock the secrets of universe.

"Ptolemy created a universe that lasted a thousand years. Copernicus created a universe that lasted four hundred years. Einstein has created a universe, and I can't tell you how long it will last."

- George Bernard Shaw

4. The Expanding Egg

Sanskrit is a beautiful language. Each word in Sanskrit tells its meaning itself. Each word has been thought carefully. Sanskrit is not a product of evolution from an earlier language. It has been designed to be what it is. When Vedic sages coded the knowledge of particle physics and cosmology, they were well aware of the possibility that one day the code may be lost due to the decline of their civilization. Therefore they chose the words very carefully to provide vital clues about the code. In this book we will dissect each word, go to its roots, and discover the lost Vedic science.

4.1: The Expanding Universe

The word for universe in Sanskrit is "Brahmanda", which is made by joining of words "Brahma" and "Anda". Brahma is derived

from root "Brha" meaning to expand and "Anda" means egg. Thus "Brahmanda" means expanding egg. Concept of the universe as an egg is found in nearly all ancient civilizations, the source of which is obviously the Rgveda. The concept of Martanda discussed later in this chapter is related to the egg-shaped universe. The universe is described as an egg in most post-vedic scriptures.

"Apah were indeed Salila earlier. Desire arose in it. They labored. From that heat arose. From heat golden egg was born. Golden egg was swimming in that for a year.

Satapatha Brahmana 11.1.6.1

"Whole universe including moon, sun, galaxies and planets was inside the egg. Egg was surrounded by ten qualities from outside."

Vayu Purana 4.72-73

"At the end of thousand years Egg was divided in two by Vayu."

Vayu Purana 24.73

"From that golden egg earth and heaven were made."

Manusmrti 1.13

In Matsya Purana 2.25-30 following story is told about creation. After Mahapralaya, dissolution of the universe, there was darkness everywhere. Everything was like in a state of sleep. There was nothing, either moving or unmoving. Then Svayambhu, self-being, manifested, which is the form beyond senses. He created water first and established the seed of creation into it. That seed turned into a golden egg. Then Svayambhu entered in the egg, and he is called Visnu because of entering. The concept of the universe as an egg is based on sound scientific reasoning. We will discuss the scientific basis of this shape later in this book during the discussion of Vedic cosmology.

4.2: Birth of Gods

What happened during the initial moments of creation? The Big Bang cosmology gives a very dramatic account of first few moments. The universe was extremely hot and it went through a very rapid expansion stage initially called inflation. The Vedic viewpoint differs from this view. The initial moments of creation are described in the following hymn from the Rgveda:

Rgveda 10.72
Sage: Laukya Brhaspati or Brhaspati Angirasa or Daksayani Aditi;
Deity: Gods; Metre: Anustupa

1. We speak about the birth of Gods clearly. Who says the praises, will see them in later ages.
2. Brahmanaspati created these (everything in the universe) like an artisan. In the earlier age of gods manifest was born from unmanifest.
3. In the first age of gods, manifest was born from unmanifest. Then quarters of the heaven (Asa) were born, after that one whose legs are extended.
4. From the one whose legs are extended, was born Bhu, and from Bhu were bom quarters of the heaven (Asa). From Aditi Daksa was born, and from Daksa Aditi was born.
5. Daksa, your daughter Aditi gave birth. Gracious, immortal bonded gods were bom from her.
6. When gods were sitting in this Salila firmly established, from their dance penetrating dust came up.
7. When gods pervaded whole universe, then in ocean sun was brought near.
8. Those eight sons bom to Aditi, with seven she went to gods, and left Martanda away.
9. With seven sons Aditi went to earlier age. For the birth and death of people* (she) accepted Martanda again.

4.3: The Dead Egg

The last two verses tell us about Martanda, and here lies the seed of a gigantic misconception that man was created in the beginning of the universe. Martanda means dead egg. Egg is the universe itself, so dead egg means a universe that had no life. The formation of the universe was not a spontaneous process. The universe had to expand in order to exist, but forces of expansion and contraction were in a delicate balance in the beginning. The universe did not keep on expanding continuously is the Vedic viewpoint. After an initial expansion, the universe started to contract. This is the meaning of Aditi going to earlier age. In the Satapatha Brahmana there is an interesting story about Martanda.

"Aditi had eight sons. Only seven out of them were called Adityas. Eighth Martanda did not have differentiated organs. Adityas saw that he did not match with them, so they divided his organs. Then he turned into a man. He was named Vivasvana and all people were born from him." Satapatha Brahmana 3.1.3.3-4

Taittiriya Samhita 6.5.6.1 says that Aditi gave birth to an immature egg. In Mahabharata, Harivamsa Parva 9.5, Kasyapa says to Aditi due to ignorance that her son is not dead, but he is inside the egg. Therefore he is called Martanda. The gist of all these stories is that fundamental forces of nature were not fine tuned for the creation of the universe. After an initial expansion the universe started to collapse. Then the strengths of fundamental forces were adjusted, and the universe began to expand again. Once the universe became steady, it was named Vivasvana, where one could live. Satapatha Brahmana 3.1.3.4 is the source of the myths that man was created in the beginning by God. It is important to note that Vivasvana is the universe and he could not possibly give birth to human beings. In Rgveda 10.17.1 Yama has been called son of Vivasvana, and in Rgveda 10.14.1 Yama has been called

Vaivasvata meaning son of Vivasvana. The sage of hymns 8.27-31 in the Rgveda is Vaivasvata Manu. Vaivasvata means son of Vivasvana. In Indian scriptures Vivasvana is father of Manu, first king, and in Iranian scripture Vivangahvanta (i.e. Vivasvana) is father of Yima (i.e. Yama), also the first king. Once the creation of human beings was accepted soon after the creation of the universe in post-vedic literature, the Vedas were assumed to be delivered to human beings in the beginning. Though the knowledge contained in the Vedas is eternal, the Vedas were discovered by the sages of the Indus-SarasvatI civilization. The universe is billions of years old, and history of human civilization is only 10,000 years old. Before 10,000 years ago human mind was not developed enough to comprehend the knowledge contained in the Vedas. Human history, and obviously history of India as well, is only 10,000 years old, and the concept of Indian % history being millions of years old as described in the Puranas is wrong resulting from the confusion of the Vedic cosmology and human history. There is indeed human history in the Puranas, but that starts only when the Puranas stop describing the Vedic science as human history. This fact was indeed obvious to the authors of the Puranas. Vedic concepts are very abstruse, and such abstruse concepts can not keep ordinary people interested in Dharma, therefore the Puranas deliberately gave beautiful representations to these concepts. To ordinary Hindus they are spellbinding stories, but behind these stories is hard-core science, which educated Hindu is supposed to know. Unfortunately, long time back all Hindus forgot the science behind it, and then Hindus could no longer defend their Dharma from the onslaught of Christianity and Islam. The source of several ideas found in Christianity and Islam are Hindu scriptures, which have been borrowed without having the slightest idea about the real scientific meaning. In ancient and medieval world Hindus (including Buddhists) had spread their ideas far and wide. Consider the following expression from the Taittiriya Brahmana.

"After creating the universe and people, Prajapati went to sleep."
Taittiriya Brahmana 1.2.6.1

Similar expression is also found in the Bible (Genesis 2.2), which says that God rested on seventh day after finishing all the work..

4.4: The Lord of Expansion

Verse 10.72.2 tells that Brahmanaspati created the universe like an artisan. Brahmanaspati means the Lord of expansion. Thus Brahmanaspati can be identified with the expansion of the universe, and this mantra tells that universe was created due to expansion. Another God in the Rgveda, who is used interchangeably with Brahmanaspati is Brhaspati, and the meaning of Brhaspati is also the same. Brhaspati in post-vedic scriptures becomes the priest of the gods. Word Brhaspati has been used 128 times in the Rgveda and the word Brahmanaspati 49 times. Eleven complete hymns are dedicated to Brhaspati (1.40,1.190, 2.23, 2.24, 2.25, 2.26, 4.50, 6.73, 10.38, 10.67 and 10.182) and in two other hymns (4.49 and 7.97) he has been praised along with Indra. Rgveda 2.24 describes the glorious deeds of Brahmanaspati.

Rgveda 2.24
Sage: Grtsamada Bhargava Saunaka; Deity: Brahmanaspati,
Metre: Jagati, 12,16 - Tristupa

1. Brhaspati, who rules the world, may he obtain our praises. We praise you by new great speeches, and your friend among us who praises you, may he refine our thoughts.
2. Brahmanaspati, who bent the bendable by his strength, who tore apart Sambaras in fury, who shook the unshakable, entered

the Vasumanta mountain.

3. That is the work of the best god among the gods, that firm became pliant, hard became soft. He brought cows out, killed Bala by Brahma, hid the darkness and lighted the heaven.
4. The well with mouth of stone and stream of honey which Brahmanaspati broke by his strength, that was drunk by sun's rays. He watered the streams a lot at once.
5. He opened the door of waters, that have existed and that will form later, by months and years. The deeds that Brahmanaspati performed, one and the other use the waters effortlessly.
6. Searching on every side they discovered the remotest wealth hidden by Panis. Those wise ones after seeing the untruth, to enter it, went back to the place they had come from.
7. Truthful wise ones saw the untruth and stood on the great path again. They left Agni produced by their arms in the mountain, who was not there before.
8. Brahmanaspati uses bow with truth as string, wherever he wants, he pervades. Strings drawn to his ear he throws the successful arrows to see the men.
9. He organizes well, he leads well, he is well praised, he priest Brahmanaspati fights well. When all-seeing holds strength and wealth, then sun heats up without effort.
10. All these first to be known riches, which both kinds of people enjoy, belong to rain-producing Brahmanaspati, who provides vast capabilities.
11. All pervading Brahmanaspati shows his greatness even in smaller fights. The god expands far bigger than other gods, and envelops them from all side.
12. Wealthy Indra and Brahmanaspati, laws of both of you always hold, even waters can not violate your laws. Come straight towards our oblation and food like two horses connected to the chariot.
13. Fast moving horses hear, civilized wise people hold the wealth. May the strong, who is hostile to enemies, pay back our debt. He, Brahmanaspati, is vigorous in hostile encounters.

14. Fury of Brahmanaspati, performer of great deeds, became true as he wished. He brought the cows out, divided them by great procedure for heaven, and they started moving separately by his power.
15. Brahmanaspati, let us be the master of all well regulated food and wealth, our braves procreate braves. O lord of all, may you hear our hymns.
16. Controller Brahmanaspati, may you know this hymn. Nourish our children. Whom gods protect, he is very fortunate. We having brave children will speak the great knowledge.

Verse two tells that Brahmanaspati entered Vasumanta mountain. There is no mountain by this name. In the Rgveda surface of the universe is called the mountain. Expansion of the universe is not spontaneous, and the energy barrier is represented by mountain. Vasumanta means containing wealth, and thus this mountain is considered to have wealth hidden in it. This wealth is the matter and energy of the universe, which will manifest once the surface of the universe is pushed further back. In verse five Brahmanaspati is said to have opened the gates of waters. This is not ordinary water. The scientific meaning of these terms will become clear as we go along. In verse five Brahmanaspati is said to fight well. This fight is between the forces of expansion and contraction, and not between Aryans and Dravidians. In verse fourteen Brahmanaspati is said to free cows. Cows are often described in the Rgveda to be hidden in mountains, which are freed by Brahmanaspati.

"Cows hidden below were freed by two doors and cows above by one door." Rgveda 10.67.4

"When Brhaspati found the place where cows were hidden and making sound, cows came out of mountain like birds come out of egg " Rgveda 10.68.7

These cows are fundamental particles of nature, which are yet to manifest. In Rgveda 4.50.1 Brhaspati is called Trisadhastha, i.e. staying in three places. These three places are earth, atmosphere and heaven. In Rgveda 4.50.4 Brhaspati is called firstborn and having seven mouth. These seven mouths are seven dimensions of earth, atmosphere and heaven. We will take up the discussion of these dimensions later.

4.5: Purusa and Aditi

Most of the verses in Vedas are mysterious. This is so because we don't know the actual scientific meaning of these verses. My aim in furnishing complete hymns is to give my learned readers as much information as possible, so that they can help in finding the lost Vedic science. One of these cosmic mysteries is of Aditi and Daksa giving birth to each other. This is impossible if they are considered human beings. Aditi is called the mother of gods. In post-vedic scriptures Purusa and Aditi form a pair and become Visnu-Laksmi or Siva-Sakti. In Siva Purana, Daksa performs penance so that supreme mother Goddess Sakti could take human birth as his daughter Sati. This is only a representation of Aditi and Daksa giving birth to each other. Thus the Puranas did an excellent job of bringing abstruse Vedic concepts in an interesting style to the ordinary Hindus, and succeeded in preserving the invaluable Vedic wisdom for thousands of years. The Vedas are books of science, which are fully capable of keeping people mesmerized by the knowledge they contain, but once the means to disseminate the scientific knowledge were lost, people started questioning the authority of the Vedas. In the changed circumstances, the Puranas came to the rescue of Hinduism. The wise sages transformed the Vedic science in captivating stories to keep the ordinary Hindu interested in Dharma. Behind these stories there are all kinds of scientific information. Let's then go

through a beautiful story of sage Agastya and his wife Lopamudra and see what is the science behind.

4.6: Agastya and Lopamudra

Agastya is a very famous Vedic sage. He is credited with spreading of Aryan culture in south India. He is also supposed to be the author of first Tamil grammar. Agastya is derived from word Aga, which is formed by adding prefix "a" meaning negation to root "ga" meaning to go. Thus Agastya means one who does not move, i.e. remains fixed. Wife of sage Agastya is Lopamudra. Lopa means disappearance and mudra means wealth, thus Lopamudra means disappeared wealth. Names in the Rgveda are not proper names, but they have a scientific meaning, which can be understood from its etymological meaning. The Rgveda is not about historical people, but it tells the story of the evolution of the universe by personifying scientific phenomena. In Vedic cosmology the universe has a center, and matter and energy is continuously being created at the surface of the universe as universe expands. Looking backward in time the universe had no matter, energy and space at time zero. There is a beautiful dialogue between Agastya and Lopamudra in the first book of the Rgveda, which explains the story of creation.

Rgveda 1.179
Sage: 1,2 - Lopamudra, 3,4 - Maitravaruni Agastya, 5,6 - disciple; Deity : Rati; Metre: Tristupa, 5 - Brhati

1. Lopamudra: I have been practicing self-restraint for several winters, getting old by the passage of days, nights and dawns. Old age takes away the beauty of body. Vigorous should go near his wife (before that happens).

2. Lopamudra: Those truth-speaking people of past, who spoke truth with gods, could not find the end of restraint. Wife met the mighty husband.

3. Agastya: Our labor has not gone waste, because gods protect us. We have defeated all our enemies. Let's win the match of hundred tricks here. Let's meet like couple and produce children.

4. Agastya: Like a restrained river, desire has come to me from here, there and somewhere. Lopamudra is mating with strong husband, fickle-minded is enjoying the composed taking long breaths.

5. Disciple: I pray to Soma, who is near and in my heart. If we have sinned, then he forgive us, because mortals have many desires.

6. Disciple: Agastya excavated with spade desirous of children, descendents and strength. Fierce sage nourished the people of both color, and obtained true blessings among gods.

This dialogue is the representation of early universe devoid of matter, energy and space. Lopamudra represents the state of vanished matter and energy and Agastya represents the fixed center of the universe. The first verse tells that the expansion of the universe was not very rapid as in inflationary Big Bang model. Instead there was a long incubation period before the expansion could become steady. It also says that universe was cold in the beginning as opposed to the infinitely hot universe of Big Bang model. The third verse tells us that the battle between forces of expansion and contraction has finally been decided in the favor of expansion, and the process of the production of matter and energy is about to begin. Last two verses are told by a disciple of Agastya, who overheard the conversation between Agastya and Lopamudra. In verse five Soma is considered near and inside. I will take up a detailed discussion of Soma later in the book. Forgiveness is asked from Soma, as Soma could have an adverse effect on creation. Sixth verse relates excavation with creation.

This excavation is the breaking up of mountains. The surface of the universe is represented as mountains, and the expansion of the universe is the excavation that results in the production of the children, i.e. matter and energy. Most importantly, the second half of the verse refers to the production of children of two colors. What could be these two colors? Black and white, of course. These two colors represent matter and anti-matter. This disproves the myth of Aryan invasion, the myth of Aryans of fair complexion overpowering the dark-skinned Dravidians. In the Rgveda matter is represented as white and anti-matter is represented as black, the colors white and black were chosen to represent the opposite nature of matter and anti-matter. Rgveda talks about the destruction of black-skinned people, but it is not about people, it is about annihilation of anti-matter. Our universe is matter-dominated and this could not have happened without the annihilation of anti-matter.

Now that you know the Vedic viewpoint that the expansion of the universe was not spontaneous, you must be wondering what caused the expansion? What are the forces that create expansion and what are the forces that oppose it? The battle between the forces of expansion and contraction is an epic battle in the Rgveda, immortalized in the battle between Indra and Vrtra, and the scene of this battle is the edge of the universe.

"For I can end as I began. From our home on earth we look out into the distances and strive to imagine the sort of world into which we are bom. Today we have reached far out into space. Our immediate neighborhood we know intimately. But with increasing distance our knowledge fades, until at the last dim horizon, we search among ghostly errors of observations for landmarks that are scarcely more substantial. The search will continue. The urge is older man history. It is not satisfied and it will not be suppressed."

- Edwin Hubble

5. Edge of the Universe

You have already seen that the universe has the shape of an egg, and there is a boundary of the universe, and outside of the universe is ten-dimensional according to the Vedas. In contrast to the Vedic cosmology, the universe has no boundary in the Big Bang cosmology. The boundary of the universe is the scene of a fierce battle between forces of expansion and contraction in the Vedic Cosmology. When this physics was forgotten, this battle became a battle between good and evil, between gods and demons, between God and Satan.

5.1: Indra and Vrtra

The main force of expansion in the Vedic cosmology is Indra, and his chief adversary, the main force of contraction, is Vrtra. Indra is often referred to as Purandara meaning one who breaks fortified towns (Pura). Pura is no ordinary town, but the entire universe, that is why the life principle of the universe has been named Purusa. Thus Purandara means one who breaks the universe apart. Vrtra means one who covers, and is derived from the root "Vr" to cover. If Indra is the one who breaks the universe apart, then his chief adversary Vrtra must be the one who covers the whole universe. The Taittiriya Samhita says that precisely.

"Vrtra covered all three lokas."   Taittiriya Samhita 2.4.12.2

Three lokas constitute the universe, and therefore Vrtra was covering the entire universe. If Vrtra is located at the edge of universe, then he can be said to be located very far away. One verse in the Rgveda attests to this.

"Vrtra was far above in Antariksa."   Rgveda 2.30.3

The battle between Indra and Vrtra has been described again and again in the Rgveda as this is the central point of the Vedic cosmology. Let's then go through a Vedic hymn that describes this extraordinary battle in detail.

Rgveda 1.32
Sage: Hiranyastupa Angirasa; Deity: Indra; Metre: Tristupa

1. Now I describe the glorious deeds of Indra, who holds Vajra. He killed the serpent and made waters flow. He broke the hearts of mountains.
2. He killed the serpent, which was taking refuge in mountain.

Tvasta made the Vajra for him. Like the cows making sounds, flowing waters reached the sea.

3. Mighty Indra chose Soma, and drank from three containers. Generous Indra held Vajra in his hand, and killed first bom among the serpents.

4. O Indra, when you killed first born among the serpents, you also made the deception of deceivers ineffective. Then you created dawn and sun in heaven, afterwards you could not find any enemy.

5. Indra severed and killed the great coverer Vrtra by mighty devastating Vajra. Like a trunk of a tree cut down by axe, serpent was lying on earth.

6. Unlike a good warrior, arrogant engaged the mighty warrior, expeller of enemies, who can subdue several opponents. Enemy of Indra could not withstand the devastating blows of Indra, and broke into several pieces at once.

7. Without leg and without hand, Vrtra fought Indra. Indra hit him by Vajra on his head. Like a weakling fighting a mighty warrior, Vrtra was lying scattered at several places.

8. Like the river overflowing its banks, waters started to flow recklessly over lying Vrtra. Whom Vrtra was holding by his great extent, the serpent was trampled under their feet.

9. Mother of Vrtra became weak. Indra attacked below her. Then mother was on top and son was below. Like a cow over her calf, Danu was lying.

10. Body was lying among the water-streams, which never stop and never rest. Waters were flowing over the hidden Vrtra. The enemy of Indra was lying in deep darkness.

11. Wife of Dasa and protected by serpent, waters were held back lite cows by Pani. The gate holding waters was closed, Indra killed Vrtra and opened them.

IX When Vrtra counterattacked, one god Indra became the hair of horse. Mighty Indra won the cows, won Soma, and freed seven rivers to flow.

13. Neither lightening, nor thunder were successful for him.

Neither fog nor hail was successful. When Indra and serpent fought, generous Indra won for coming years.
14. O Indra, which follower of serpent did you see that fear entered the heart of slayer of Vrtra? You crossed nine and ninety streams like a terrified eagle.
15. Indra, who holds Vajra in his hand, is the king of moving and stationary, of peaceful and horned animals. He is the king of men. He is enveloping like the felly of wheel surrounds spokes.

It is clear from these verses that Vrtra is same as the serpent. The serpent was holding the waters, which was freed when the serpent Vrtra was slain. Vrtra was not holding an ordinary amount of water. Verse 12 tells us that the slaying of Vrtra resulted in freeing seven rivers to flow. Freeing of seven rivers by Indra in this verse is not an isolated example, but is repeated several times in the Rgveda. The Vedic idea of a serpent holding all the waters is found in different myths all over the world.

5.2: Frog who Drank all the Waters

The myth of a frog that drank all the waters is found among North American Indian tribe Algonkins, Australian Indians and Andaman Islanders[l]. The Algonkins myth relates to the story of a man named Ioskeha. The earth was earlier arid and sterile. Ioskeha killed the gigantic frog that had swallowed all the waters. The waters were released and Ioskeha guided the waters in to smooth streams and lakes. According to the Australian myth, a huge frog was holding all the waters, and there was no water available anywhere on the earth. The frog was made to laugh and waters ran out of its mouth. In the myth of the Andaman Islanders, a toad drank up all the waters, and there was a drought. When the toad started to dance, the waters gushed out of its mouth**.** The source of all these myths is the legendary battle of Indra with

Vrtra. As the myth spread, the serpent turned into a frog, but the basic idea of a serpent holding all the waters remained the same.

5.3: Electric Force

Having realized that the battle between Indra and Vrtra is the battle between the forces of expansion and contraction, it is now time to pinpoint which forces are represented by Indra and Vrtra. Modern science talks of three fundamental forces in nature: gravitation, strong nuclear and electroweak. Force of gravitation is the force between any two masses and is always attractive. It is the force that acts over long range and holds solar system and galaxies together. Indra can not be the force of gravitation, as gravitation is an attractive force. Strong nuclear force is responsible for keeping atomic nucleus together, thus Indra can not be this force either, because the force represented by Indra must be long range. Electroweak force consists of weak nuclear force and electromagnetic force. Weak nuclear force is a very short-range force acting at a distance of around 10^{-17} meter, and we are considering here a force that acts on a cosmic scale. Thus weak nuclear force is also ruled out. Electromagnetic force consists of electric force and magnetic force. Both of these forces can be either attractive or repulsive and can act over long distances. Indra will be identified here as electric force based on Further evidence in the Vedic literature. In Rgveda 4.17.13 Indra has been called "Asanimana" meaning one who possesses thunderbolt. Furthermore, Kausitaki Brahmana 6.9 says that Indra is Asani (thunderbolt). The Satapatha Brahmana says:

Who is Indra and who is Prajapati? Thunder is Indra and Yajna is Prajapati." Satapatha Brahmana 11.6.3.9

Thus it becomes clear that Indra is related to electrical phenomena and his identification with electric force is on solid grounds.

5.4: Surface Tension

Our next agenda should be now to identify Vrtra. We know that Vrtra covers the whole universe and is a force of contraction. This brings immediate realization that Vrtra is none other than the surface tension of the universe. A drop of fluid tends to become spherical in order to minimize its surface area. There is energy associated with every surface, and every system tries to minimize its energy. This is why bubbles are spherical, because sphere is the configuration of the lowest surface area. If the universe is trying to expand, its surface area is going to increase, which will increase the total surface energy of the universe. Surface tension will act to minimize the surface area of the universe, in other words surface tension will try to contract the universe. The electric repulsion force must be stronger than the surface tension force in order for the universe to expand. This is the grand cosmic battle of Indra and Vrtra, and it is given so much prominence in the Rgveda for the reason that outcome of this battle determines whether there will be a universe or not. The Rgveda describes this grand battle in various ways, one of them is the killing of wild boar.

5.5: The Slaying of Varaha

Varaha has the apparent meaning of wild boar. It is derived from root "Vr" and etymologically means one who covers. Thus etymological meanings of Varaha and Vrtra are same. It is not a coincidence that the Rgveda describes the killing of Varaha as

well as Vrtra. The slaying of Varaha is attributed to Visnu and Trita.

"Visnu killed Varaha and stole cooked food." Rgveda 1.61.7

"Trita, strengthened by Indra, killed Varaha using iron fingernails." Rgveda 10.99.6

Varaha and Vrtra both represent the surface of the universe.
Trita is said to have fingernails of iron, which represents the 11
magnetic properties of Trita. Some of my readers who know about 11
modem cosmological theories in detail, might be considering this 1
discussion on surfaces absurd, as the universe is not supposed to I
have any surface in the first place. The reality is scientists have *
already found the evidence of surface phenomena at work on cosmological scales, but have failed to identify it as such. Scientists have recently found bubbles and voids at cosmic scale, a hallmark of surface tension at work.

5.6: Bubbles and Voids in Space

One of the most important assumptions underlying the Big Bang cosmology is that the universe is uniform everywhere. This means mat all parts of the universe have same mass-energy density and structure. In such considerations, choosing the appropriate unit of mass-energy dispersion becomes important. We know that planets and stars are not uniformly distributed. Scientists chose a larger scale, and at first believed that galaxies are spread uniformly over space. When Hubble conducted a survey of44,000 galaxies, he did not find them uniformly distributed, instead he found considerable clustering. His survey was followed by that of Fritz Zwicky in 1938 and again it was found that galaxies were clunked, and not uniformly distributed. This finding gave rise to

the consideration that cluster of galaxies is an appropriate unit, and that clusters of galaxies are spread uniformly over space. Our galaxy, Milky Way, is part of a cluster of twenty five galaxies. French astronomer Gerard de Vaucouleurs conducted a survey on an even bigger scale in 1950, and found that even clusters of galaxies were not uniformly distributed. He grouped clusters of galaxies in superclusters spreading 200 million light years. Scientists soon came to believe that supercluster was the appropriate unit over which the universe looked uniform. Probing even further scientists have recently found that superclusters are located over the surface of giant bubbles. Inside of the bubbles are large voids containing no galaxies, almost bereft of matter and energy. We have a reference to this large scale structure in the Satapatha Brahmana:

"When Apah were heated, foam (Phena) was created."
Satapatha Brahmana 6.1.3.2

Apah means water and its scientific meaning will be discussed in the chapter "Return of the Elements". There are ample references to prove that Vedic sages considered Apah to pervade whole universe. Not knowing the real meaning of Apah, all religions and mythologies talk of a universe filled with water in the beginning. The verse quoted above clearly proves that Vedic sages considered surface phenomena to be at work, so that Apah were organized as foam. The finding of bubbles on the large scale structure of the universe is a clear proof that the surface tension has been at work during the evolution of the universe. As modern scientists have failed to take the surface tension in account, it is no wonder that after seventy years of rigorous research by the best brains of our times, the Big Bang cosmology can not even predict the evolution of the galaxies. The reason is clear. Whole framework of the Big Bang cosmology is wrong. The chapters on the Big Bang and the Vedic cosmology discuss this further.

5.7: Deeds of Indra

More than 250 hymns have been dedicated to Indra in the Rgveda. Another fifty plus hymns sing the praises of Indra in combination with other gods like Vayu, Varuna, Agni, Visnu, Soma and Brhaspati. The Vedic sages do not get tired of describing the glorious deeds of Indra. More than one fourth of the Rgvedic verses are about Indra. The hymn traditionally considered the most favorite hymn of Indra is presented below. This hymn being the most important hymn about Indra is helpful in understanding the Indus Valley Seals as well.

Rgveda 2.12 Sage: Grtsamada Bhargava
Saunaka; Deity: Indra; Metre: Tristupa

1. Who is first among the gods, who after being bom adorned gods from his actions, from whose impulse earth and heaven tremble, who is famous for his strength, he, O people, is Indra.
2. Who made the trembling earth firm, who pacified the angry mountains, who measured the wide atmosphere, who supported the heaven, he, O people, is Indra.
3. Who killed the serpent and made seven rivers flow, who got the cows hidden by Bala out, who created Agni between two rocks, who kills enemies in wars, he, O people, is Indra.
4. Who has made the shaking world, who has put Dasa varna in a hidden place below, who conquers like the hunter killing dogs, the lord who snatches nourishing material from enemies, he, O people, is Indra.
5. About whom people ask where is the awful, and say that he does not exist, he the lord destroys the nourishing material of enemies, so have respect for him, because he, O people, is Indra.
6. Who instigates rich and poor, knowledgeable, needy and poet, who has beautiful cheeks, who protects those extracting Soma

juice using stones, he, O people, is Indra.

7. Whose horses are, whose cows are, whose villages are, whose all chariots are, who created sun and Usa, who leads the waters, he, O people, is Indra.

8. Whom earth and heaven moving together call for help, whom high and lowly both enemies call, whom two warriors sitting on the same chariot call in several ways, he, O people, is Indra.

9. Without whose help people can't win, whom warriors call for protection, who became world's model, who moves the unmovable, he, O people, is Indra.

10. Who kills the sinners and ignorants by Vajra, who does not let the arrogants win, who kills the Dasyus, he, O people, is Indra.

11. Who found Sambara hiding in the mountains during fortieth winter, who killed the valiant serpent and sleeping Danu, he, 0 people, is Indra.

12. Who is seven-rayed strong bull, who freed seven rivers for flowing, who holding Vajra in his hand killed Rohana riding on heaven, he, O people, is Indra.

13. For whom earth and heaven bow, whose strength mountains fear, who drinks and protects Soma, who holds Vajra in his hand, he, O people, is Indra.

14. Who protects those extracting and cooking Soma juice, who protects those reciting hymns and those active in worship, who increases by hymns, whose Soma is, whose wealth is, he, O people, is Indra.

In verse three Indra is credited with getting the cows hidden by Bala out. Elsewhere in the Rgveda Indra is said to have killed. Bala and freed the cows hidden in mountains (Rgveda 1.11.5, 2.14.3, 8.14.8). Similarly, Indra frees cows well hidden in rocks (Rgveda 5.30.4,6.43.3). According to Rgveda 6.39.2 Indra breaks apart mountains. This mountain is the surface of the universe. I have also earlier shown that Vrtra is the surface of the universe. Maitrayani Samhita 4.5.1 shows the equivalence of mountain

and Vrtra by saying "Girirvai Vitro", meaning mountain is indeed ' Vrtra. In Vedic cosmology the surface of the universe is mountain, ı and the seven rivers of the Rgveda originate from this mountain, i.e. surface of the universe. The cows hidden in mountain are not ' ordinary cows. In the Rgveda Indra is shown as having affection for cows, and this quality later on passes to Lord Visnu during the age of the Puranas.

"Indra desires to obtain cow." Rgveda 8.17.15
"Indra always wins the battle for cows."
Rgveda 4.17.10,4.21.4
"Indra loves cows." Rgveda 1.84.11

The shelter for cows is called Gotra in Sanskrit. Gotra is same as the mountains which Indra breaks (Rgveda 1.51.3, 3.30.21, 3.43.7, 4.16.8, 10.103.7). This is why he is called Gotrabhid, breaker of Gotra, in Rgveda 6.17.2 and 10.103.6. It is due to his association with cows, that Indra is called bull in the Vedas.

5.8: Indra, the Bull

Asfco Parpola in his book "Deciphering the Indus Script" describes an amulet from Harappa (3305) showing a deity with bull's legs and a raised club[2]. Surprisingly he does not give any clue as to what this figure could represent. Proponents of the Aryan Invasion theory use the Vedas, Brahmanas, Upanisads and Puranas selectively to prove that the Indus Valley Civilization was Dravidian Civilization. For this reason they find representation Rudra and Varuna in the Indus seals, because Rudra and Varuna have been declared as a borrowing from the Indus Valley civilisation. In fact, there is no such thing as borrowing from the

Indus Valley Civilization, because the Indus Valley Civilization is the Vedic Civilization. This amulet 3305 from Harappa is the proof of my thesis. The deity has bull's legs, and Indra is considered bull in the Vedas. In Rgveda 2.12.12 Indra is called a bull, and so in the other Vedas.

"Bull is the form of Indra:" Atharvaveda 9.4.7-8

The deity is depicted as holding a raised club in one of his hands in this amulet. Now, the Vedas repeatedly describe Indra as holding Vajra is his hand. Thus, there is no room to doubt that this deity is the representation of Indra. With this identification, we have permanently buried the Aryan Invasion Theory and the thesis of Indus Valley Civilization being Dravidian. There is no way representation of Indra in Harappa can fit in these theories. Indra is supposed to have destroyed this civilization, how could these people be worshipping him!!! The mighty deeds of Indra were known all over the world and people worshipped Indra everywhere albeit under different names.

5.9: Mighty Hercules

Magis of Asia minor identified the Iranian god Verethraghna with Greek Heracles, who later became Roman Hercules. Verethraghna is only a deformation of Vrtraghna meaning slayer of Vrtra. Iranians forgot Indra, but turned one of his names in a heroic god.

5.10: Serpent as Evil

You might be wondering why Vedic sages describe Vrtra as a; serpent. A serpent does something very important several times

during its lifetime. It changes its skin. What about the universe? As universe expands, its surface is destroyed, but another surface is created instantly. In effect the universe keeps changing its skin. Thus battle of Indra and Vrtra never stops, it carries on all the time. This is also one reason that this battle is described all through the Rgveda again and again and again. My opinion is that the Rgveda contains the information on the evolution of the universe as it has happened, and divided the evolution in seven important phases, each phase being described by one of the seven sages. The slaying of Vrtra has an interesting counterpart in mythology. Vrtra never dies as the universe always has a surface. In mythology also one encounters demons that rise from dead again and again. The depiction of Vrtra as a serpent and an enemy of Indra made serpent as a symbol of evil all over the ancient world, as Vedic ideas were spread far and wide.

In the Bible, Satan is depicted as a serpent, who induces Eve to eat the forbidden apple (Genesis 3.1-15). The depiction of serpent as a force of evil is based on the Vedic description of Vrtra as a serpent. In Greek mythology, the fight between Indra and Vrtra becomes the fight between Apollo and Pytho. Pytho, the great serpent, had swallowed all the waters just like Vrtra, before he was slayed. After the slaying Apollo also fled in terror just like Indra did (Rgveda 1.32.14). Apollo was also considered Sun-god just like Indra during the period of Brahmanas. We should note here that Indra is not a Sun-god in the Rgveda. In another version, the epic war becomes the fight between Perseus and Medusa, who carries several snakes on her head.

Back home in India, serpent did not become a force of evil. After all, here it was well known that this battle was not about good and evil. Indra and Vrtra both have important place in the evolution of the cosmos. In later mythology serpent on one hand became die garland of Lord Siva, and on the other hand became the companion of Lord Visnu. The serpent became Sesanaga, a serpant with several heads. Lord Visnu rests on the bed of his

coils and Sesanaga also provides shade to Lord Visnu by spreading his heads above. Thus Sesanaga covers Lord Visnu the same way Vrtra covers the universe. We should remember that in Hinduism universe is not different from God. In Vedic science, the universe has a tripartite division into earth, atmosphere and heaven and in this division lies the ultimate secret of the universe.

"Observations are to be regarded as discrete, discontinuous events. Between these are gaps which we cannot fill in." - Erwin Schrodinger

6. Parallel Spaces

The tripartite division of the universe in Prthivi (earth), Antariksa (atmosphere) and Dyau (heaven) is very well established in the Vedic literature. Each of them is called a "Loka" and thus the universe is "Triloka", consisting of three lokas. Therefore the God is called "Trilokmatha" meaning the lord of three lokas. Prthivi means the broad and extended one, Antariksa means what exists in between, and Dyau means bright. Like other technical words in the Vedas, these three words have exact scientific meanings different from their apparent meanings. These three lokas were formed by the division of the egg-shaped universe.

"At the end of thousand years Egg was divided in two by Vayu."

Vayu Purana 24.73

The universe was divided in two. This division is like a change of phage of chemical substances. Consider a fluid that transforms

into a solid and liquid phase due to change in temperature. Whenever two phases are formed, there is always an interface between these phases. Antariksa is the interface between Prthivi and Dyau. Taittiriya Upanisad 1.3.1 says that Antariksa is the junction of Prthivi and Dyau. The Satapatha Brahmana says:

"These lokas were together in the beginning. Earth and heaven then separated and the space between them became Antariksa."

Satapatha Brahmana 7.1.2.23

Three lokas were formed not because the universe was divided in three, but because it was divided in two. Should the interface be considered a separate phase? Scientists are divided on this issue. Gibbs does not consider interface to be a separate phase and instead draws an imaginary plane through the interface dividing the phases in two. Guggenheim on the other hand considers interface to be a separate phase, and assigns all the properties to an interface that a phase can have[l].

The most important concept of the Vedas is the division of the universe. Without a proper understanding of this division the Vedas will seem meaningless. The Vedas themselves declare this emphatically. How was the egg divided? Was it divided in an upper half and lower half? To answer this question let's consider the first verse of the Purusa hymn again.

6.1: Three Spaces

"Purusa has thousand heads, thousand eyes and thousand legs. He is covering Bhumi from all around, and is beyond also in ten-finger form." Rgveda 10.90.1

You have already seen that Bhumi here means the entire universe. Bhumi and Prthivi have similar meaning and have been

used interchangeably in the Vedas. In Rgveda 10.81.3 the word "Dyavabhumi" has been used, while in most places "Dyavaprthivi" is used. Sayana in his commentary on Atharvaveda 6.18.2 says that Bhumi is Prthivi. Sayana in his commentary (Rgveda Bhasya) on Rgveda 10.90.1 and Mahldhara in his commentary (Yajurveda Bhasya) on Yajurveda 39.1 say that "Bhumim Brahmandagolakarupam" meaning Bhumi is the round universe. Thus I am on very solid grounds to consider Prthivi as the universe. If Prthivi is the universe, then what are Antariksa and Dyau. After all the universe consists of Prthivi, Antariksa and Dyau. I hope my readers can guess where my arguments are headed. The egg was not divided in upper half and lower half, but in an intermingled web. It is a web that pervades the whole universe. This web is what is considered Mayajala meaning a measured web. Maya is a powerful term in Hinduism, which has now come to mean an illusion that the universe is. However, Maya is formed from root "ma" to measure, and could not have meant illusion originally. The universe is made on scientific principles, and that's why it is well measured. The universe consists of three intertwined webs, Prthivi, Antariksa and Dyau. Prthivi can be given a scientific name "observer space". Prthivi is our space, the space in which we live and die, whatever we can see and observe. Earth, sun, stars, galaxies all are part of Prthivi. From one end of the universe to the other end is the expanse of Prthivi, and that is what the name Prthivi means: the broad and extended one. Dyau will be termed "Light space" because light propagates in this space as you will find in more detail later, and Antariksa will be termed "Intermediate space" as this space exists in between observer space and light space. Prthivi, Antariksa and Dyau exist at every point in space. If we could make a powerful microscope that could make observations at the most subtle level, then we will see the space divided in three strands belonging to observer space, intermediate space and light space. A verse from the Yajurveda clearly states that the

division of universe was done on a very subtle level, and not on a gross level.

"I place earth and heaven inside you. I place wide atmosphere inside you." Yajurveda 7.5

The Vedic sages had the capability of looking at such a subtle level, which is beyond the reaches of modern science. The concept of Kosas is related to observations at different scales. Taittiriya Upanisad 2.2-5 describes the various levels of observation. The grossest level of observation is called Annamaya Kosa, which corresponds to macroscopic observation. Pranamaya Kosa refers to observations at a level more subtle than Annamaya Kosa. This may be referring to microscopic observation. Next three levels of observation in order of subtlety are Manomaya Kosa, Vrjnanamaya Kosa and Anandamaya Kosa.

At present, modern science is not capable of observing at such subtle scales. Our observations are limited to observer space, in extreme cases our observations can reach the intermediate space, but our observations never reach the light space, which is hidden very deep. These three spaces are the three legendary steps of Visnu in the Rgveda.

6.2: The Steps of Visnu

Visnu together with Brahma and Mahesa forms a trinity in Hinduism. The form of Visnu in the Puranas is slightly different from that in the Vedas. Visnu is a friend of Indra in the Rgveda, who helps Indra in the slaying of Vrtra. Though hymns dedicated to Visnu are few in the Rgveda, this does not mean that Visnu has less significance in the eyes of the Vedic sages. In the Rgveda the number of hymns and mantras are carefully chosen. Three complete hymns have been dedicated to Visnu in the Rgveda

(1.154, 1.156, 7.100), which correspond to the three spaces of the universe. There are few mantras separately for Visnu (1.22.17-21, 1.155.4-6, 7.99.1-3, 7.99.7). He is also invoked with other gods in some hymns and mantras (Rgveda 1.22.16, 1.155.1-3, 5.3.3,6.69, 7.99.4-6). Visnu is derived from root "Vis" meaning to enter or pervade, and he is called so because he pervades the whole universe. Brahmanda Purana 1.4.25 says that he is called Visnu because he has entered in everything. Three steps of Visnu are referred to several times in the Vedas (Rgveda 1.22.17,1.154.3, 1.155.4, Atharvaveda 7.26.5). What are his three steps? Yajurveda 2.25 and Satapatha Brahmana (1.1.2.13,1.9.3.9,3.6.3.3) identify the three steps as the heaven, atmosphere and earth. Taittiriya Samhita 2.4.12.3 says that Visnu established his one third in earth, one third in atmosphere and one third in heaven. Obviously, earth, atmosphere and heaven were considered to be of comparable extent. The most important aspect of Visnu's three steps is that the whole universe is covered by these steps.

The Satapatha Brahmana 1.2.5.1-7 tells a story about the three steps of Visnu. Devas (gods) and Asuras (demons) were sons of Prajapati, and were always fighting each other. Once Devas became weak and Asuras captured the earth. Asuras started to divide earth among themselves. Then Devas brought Visnu forward and asked for his share. Asuras saw that Visnu is a dwarf, so they agreed to give Visnu as much land as he could occupy by his body. Devas thought that Visnu is Yajna, so if Asuras gave land equal to him, then they have given whole earth. They enclosed Visnu with metres and started to expand the Yajiia. Devas thus obtained whole earth for themselves. This story further develops in the Puranas, Mahabharata and Ramayana. Asura Ml was performing a Yajiia, which would give him unlimited powers. Devas went to Visnu and asked for help. Visnu took birth as son of Kasyapa and Aditi. He did not grow much and remained a dwarf. In this form he went to Bali and asked for land. Bali agreed to give him as much land as he could occupy in

three steps. Visnu measured the whole universe in his three steps and Devas became masters of the universe again. In some Puranas, Visnu covered the whole universe in only two steps, and there was nothing left for the third step.

Visnu can be identified with the universe itself. This dwarf incarnation refers to the early universe, when the universe was very small. Visnu's first step is the observer space, his second step is the intermediate space, and his third and remotest step is the light space. We get further proof of this in the Vedas. In his three steps rests the whole universe (Rgveda 1.154.2, Yajurveda 23.49). The most notable aspect of Visnu's three steps is that the third step is considered very remote and beyond the reach of anyone. His two steps can be known by humans, but third step is beyond the sight of humans and flight of birds (Rgveda 1.155.5). Wise people know earth and atmosphere, but Visnu knows the remotest (Rgveda 7.99.1). In Rgveda 1.155.3 heaven is explicitly referred as Visnu's third abode. The light space (Dyau) can not be observed by humans. If Dyau meant heaven in the Vedas, this won't make any sense, as constituents of heaven like the sun and stars are easily seen by human eyes. Among the brave acts of Visnu in the Rgveda is the slaying of the wild boar.

"Visnu killed Varaha and stole cooked food."   Rgveda 1.61.7

The slaying of wild boar (Varaha) has been discussed in the last chapter. Varaha represents the surface of the universe. As Visnu (the universe) expands, surface of the universe is broken, and thus Varaha is killed. Ironically in the Puranas, Visnu takes incarnation as a Varaha. There is a different scientific explanation of the incarnations of Visnu, which is discussed in a later chapter. In the Rgveda Indra and Visnu are shown as close friends. Visnu and Indra expand the spaces in Rgveda 6.69.5. In the Bralimanas, Visnu comes to mean the sun as the youngest son of Aditi, but there is no reason to suspect such an identification in the Vedas.

Visnu is clearly depicted as being different from Surya (sun) in Rgveda 7.99.4.

6.3: The Hidden Spaces

There are several verses in the Vedas that support the interpretation of Prthivi, Antariksa and Dyau as the observer space, intermediate space and light space respectively. Prthivi and Dyau are described as following:

"One of them is hidden and other is observable. There ways are same still divided differently." Rgveda 3.55.15

All three spaces are described beautifully in the following verse:

"Continuously moving, very wide three are positioned one on top of another. Two of them are hidden and only one is seen."
Rgveda 3.56.2

Intermediate space and light space are considered hidden, which is completely true. We can spend our lifetimes without ever realizing that these two spaces even exist. Out of these two, light space is considered hidden deeper than intermediate space. All through the Rgveda we come across references to the hidden space. A verse from the Rgveda proclaims:

"Agni, I know your three places and three forms. I know your place that is protected in various ways. I know your name that is *m* very secret place, I know the place from which you have been barn." Rgveda 10.45.2

Here the three places of Agni are observer, intermediate and lightspace, and his three forms are Agni (fire), Vayu (air) and

Surya (sun) respectively. The very secret place is light space, and Agni's name in that place is Surya. The place from which Agni is born is the golden womb.

In Rgveda 1.159.4 earth and heaven are described by following epithets: "Jam! sayoni mithuna samokasa". Jam! means siblings, sayoni means born from same womb, mithuna means couple, and samokasa means having same abode. This explicitly refers to being born together, lying one top of other like a couple and being spread all through the universe. The concept of Dyau as the hidden space is the most important concept of Vedic science without understanding which the Vedas will seem meaningless. The Rgveda itself states this in no uncertain terms.

"Vedic mantras are in the never-decaying remotest sky, where all the gods reside. One who does not know that, what will he do with Vedic mantras? One who knows that, they (gods) stay with him." Rgveda 1.164.39

The remotest sky is the light space, which is the abode of energy. Now that we have a precise understanding of what earth and heaven represent, this is the right time to appreciate a beautiful hymn dedicated to them.

Rgveda 1.185 Sage: Agastya Maitravaruni; Deity: Dyavaprthivi;
Metre: Tristupa

1. Which was born first and which later? How were they born? Who knows O wise people? They hold the universe by their strength and always keep rotating like a wheel.
2. Two unmoving without legs hold many moving, with legs, in their womb. May heaven and earth protect us from sin like parents protect the son near them always.
3. I ask for the sinless, never diminishing, bright, non-violent

donation of Aditi. May heaven and earth produce that wealth for the worshipper. May heaven and earth protect us from sin.

4. Heaven and earth, parent of gods, protect people without becoming angry. May we with day and night of gods retain the favor of both. May heaven and earth protect us from sin.

5. Two young ladies always moving together, having the ends together, sisters, staying near father, smell the center of the universe. May heaven and earth protect us from sin.

6. I call by truth the wide, great, provider of space, progenitors of gods for protection. The beautiful ones hold immortality. May heaven and earth protect us from sin.

7. I bow and praise wide earth, whose end is very far away, in this Yajiia. Those lucky and victorious ones hold everything. May heaven and earth protect us from sin.

8. If we have sinned against gods, or friends, or the lord of everything born, may our intelligence be able to destroy these sins. May heaven and earth protect us from sin.

9. May both, worthy of praise by men, protect me. May both provide us with means of protection. O gods, we noble ones desire plenty of wealth to live happily and donate generously.

10.1, of good intellect, speak that first truth for earth and heaven. Those two living near protect us from sins. Protect us like mother and father.

11. Mother earth and father heaven, what I ask for you here, let that become true. Become the protector of gods. Let us receive food, strength and long life.

While most often earth is considered the mother and heaven the father, this representation is not unique. In verse five, both earth and heaven are considered ladies, and God is considered die lather of both. In verse seven the ends of earth are considered very for and Yajna takes place at the ends. The ends are very far away, because observer space spans across the whole universe, and at the boundary of the universe the creation of matter and

energy takes place, which is called Yajna. The transformation of matter into energy is related to the concept of immortality of the gods in the Vedas.

"We are like butterflies who flutter for a day and think it is forever."
- Carl Sagan

7. The Seat of Immortality

Once you realize what Prthivi, Antariksa and Dyau stand for, your immediate concern will be to know what are their most distinguishing features. Prthivi is considered "Martyaloka" in Hindu scriptures, meaning where life has a limited span and death can not be avoided.

"Immortals purified three brilliant forms of Agni. Out of them one who eats was placed where death is inevitable, other two went in sibling Lokas." Rgveda 3.2.9

In this verse Prthivi and other two spaces are described as siblings. Modern physics tells us about the cosmic dance of the particles. Everywhere in the universe particles are being created and annihilated continuously. These particles have a lifespan between the creation and annihilation. In the Vedas Prthivi is the abode of particles, which are created and annihilated. These particles are given the name "Janah" meaning people because

they live and die like people. The Vedas talk about five type of particles again and again and give them the name "Pancajanah" meaning five people. In the commentaries on the Vedas we often encounter the confusion between four Varnas and five people. The system of four Varnas was a social order consisting of Brahmana, Ksatriya, Vaisya and Sudra. Five people refer to five type of particles, and commentators not knowing this difference often describe five people as Brahmana, Ksatriya, Vaisya, Sudra and Nisada (fisherman). This makes no sense as fisherman obviously belongs to Sudra category and can not be counted separately. Dyau is the abode of energy. Energy is not created and annihilated like particles, therefore energy can be considered eternal or immortal. Once Dyau became heaven, and various forms of energy became gods, gods became immortal in their heavenly abode. The Vedas frequently describe gods as being immortal meaning that energy is eternal. Yajurveda 32.10 says that in the third abode immortal gods live. The third abode is heaven or the light space.

7.1: Wedding of Vivasvana

The concept of hidden space has been elaborated in the Vedas by various examples. The Vedas talk about the same phenomenon in various ways. The tale of Vivasvana and Saranyu is told to illustrate the formation of three spaces.

"Tvasta is about to perform the marriage ceremony of his daughter and this whole universe has come to attend. Mother of Yama was married, great wife of Vivasvana disappeared."

Rgveda 10.17.1

"Immortal was hidden for mortals, similar lady was made and given to Vivasvana. Saranyu was there and she conceived two

Asvins. She gave birth to twins (Yama and Yami)."

Rgveda 10.17.2

These two verses describe the early universe, when universe is divided in three spaces. Vivasvana is observer space and t Saranyu is light space during this period. Saranyu means quickly k moving, which is apt name considering that light propagates in that space. Disappearance of Saranyu is the concealment of light s space. Second verse makes the point clear where Saranyu is considered immortal. So who is the replacement of Saranyu? No name is given, but intermediate space fits the description very well. The presence of Saranyu in a hidden form matches very well with the concept of three spaces, and finally two very mysterious verses make sense.

There is a Greek myth related to these verses. Zeus was unfaithful to his wife Hera on several occasions. Hera left Zeus , due to his romantic adventures and went to a place called Euboea.

Zeus asked Cithaeron for advice, who suggested that he should perform a sham marriage. A wooden image of Plataea, daughter of Asopus, was made and Zeus performed the drama of marrying her. Hera heard of this and came to the scene. She tore the bridal veil and discovered the wooden image behind it. After knowing the truth she started living with Zeus again.

Saranyu is the mother of two Asvins, but why are they called Asvins? Asvin is made from word "Asva" meaning horse. The Brahmana texts have come up with a story as an explanation. The Satapatha Brahmana tells that Saranyu assumed the form of a mare. Vivasvana took the form of a horse and mated her. From their intercourse two Asvins were bom. Again there is an exact Greek counterpart of this myth. Demeter Erinnys assumed the form of a mare and was pursued by Poseidon in the form of a stallion. Demeter was worshipped in the form of a woman with his head. This myth is not found in the Vedas and proves that Greek civilization is post-brahmanic.

7.2: The Field

Now we know that observer space is the abode of matter particles, and light space is the abode of energy. The question now is what is the significance of intermediate space? Intermediate space (Antariksa) is the abode of field. The principal deity of Antariksa
is Vayu.

"Vayu brightens in Antariksa." Jaiminlya Brahmana 1.192

Vayu being the deity of Antariksa, and Antariksa being in between Prthivi and Dyau, it makes perfect sense that universe was divided in two by Vayu (Vayu Purana 24.74). There are four complete hymns dedicated to Vayu in Rgveda (1.134,4.48, 10.168, 10.186). The meaning of Vayu is made clear by the following mantra.

"Sun and rest of the universe is woven in string. What is that string, that is Vayu." Satapatha Brahmana 8.7.3.10

Apparent meaning of Vayu is air. This verse clearly shows that here Vayu can not mean air. In fact there can not be a better definition of scientific term "field". Thus Prthivi, Antariksa and Dyau are the abodes of matter particles, field and energy respectively. Field is another form of energy, and therefore Yajurveda says:

"Vayu has penetrating brightness." Yajurveda 1.24

7.3: Fabric of the Universe

If the space is an aggregate of three intertwined spaces, out of which we can observe only one directly, our space will seem to

us as having holes, as if part of it is missing. This is the realm of quantum physics, where particles seem to be taking quantum jumps, not moving continuously, because fabric of the universe is perforated. These holes are referred to in a verse in the Yajurveda.

"May Prthivi, Vayu and Dyau complete your holes."

Yajurveda 23.43

Here Vayu represents intermediate space (Antariksa), as Vayu is the principal deity of Antariksa. Observer space (prthivi), intermediate space (Antariksa), and light space (Dyau) each are perforated, only all three together make the space complete without holes. According to the Vedas, earth and heaven were together initially and they were separated later by Vayu. These ideas traveled very widely all over the world.

7.4: Heaven and Earth

Prthivi is considered the mother and Dyau is considered the father in the Vedas, and they form a pair Dyavaprthivi together. One of the most beautiful verses of the Rgveda says:

"Heaven is my father, brother atmosphere is my navel, and the great earth is my mother." Rgveda 1.164.33

Another verse from the Atharvaveda says:

"This land is my mother, I am the son of earth."

Atharvaveda 12.1.12

In their apparent meaning earth and heaven do not look like a pair as earth is negligibly small compared to heaven. In their

scientific meaning as observer and light spaces, the description of them as a pair looks perfect. In the Vedas Prthivi can not mean earth for the simple reason that the Vedas talk of three Prthivls, while there could not be more than one earth.

"Adityas hold three earths and three heavens."
Rgveda 2.27.8

"Agni is established in first, second and third earth."
Yajurveda 5.9

The division of the universe in three spaces is at a very subtle level far beyond the capabilities of modern science to observe it, but Vedic scientists divided even that length in three, calling them upper, medium and lower. The story of the division of the universe in earth and heaven was very well known in ancient world, but their scientific meaning was known only to few outside India. These ideas were picked up by Semitic religions, without having the slightest clue as to their scientific meaning. Bible, Genesis 1.1 says that God created the heaven and the earth in the beginning. Koran 21.30 talks about the division of the universe in earth and heaven. In Greek mythology, in the beginning there was Chaos, a swirling formless mass, from which came Gaia, mother earth, and her consort Uranus, the heaven. In Egypt, Seb (earth) and Nut (heaven) formed a pair, from whom many gods were born. In Chinese creation myths an egg arises in emptiness. Pangu, the first god, was residing in the egg. Universe was divided in heaven (yang) and earth (yin), when the egg broke. Pangu held the heavens, so that earth would not be crushed. Pangu grew by ten foot everyday, and he died after 10,000 years. Animals and other features of earth were made from Pangu's body. Yang is considered male and yin is considered female in Chinese myths. Maori tribes of New Zealand also believed in a divine pair Rangi (heaven) and Papa (earth). Mangaians and Samoans of South

Pacific along with Maoris of New Zealand and Acagchemem natives in California held that heaven and earth were touching in the beginning and were pushed apart later. Among Greeks, Ouranos does the job of separating earth from heaven, while in Mangaians, god Ru does this work. Among Maoris, Tutenganahau thrusts earth and heaven apart. These ideas are Vedic ideas dispersed among inhabitants all around the globe. The world has completely forgotten where these ideas came from, because it happened a very long time ago during the dawn of human civilization.

7.5: The Cosmic Tree

Figure 7.1 shows a tree with two animal heads joined to it. These two animals are heaven and earth depicted according to the following verse in the Vedas:

"Which is that tree from which earth and heaven have been formed? O wise people, ask about that which is holding the whole universe." Rgveda 10.81.4, Yajurveda 17.20

In another verse mother earth and father heaven are described playing on a tree (Yajurveda 23.25). Analogy of God with a tree is well accepted in the Vedic literature. The Svetasvatara Upanisad says:

"There is nothing beyond him, nothing smaller or bigger. He is the one staying in heaven like a tree. All this is created by complete Purusa." Svetasvatara Upanisad 3.9

The tree chosen for this representation was sacred fig tree, called Asvattha in Sanskrit and now popularly known as the Pipala tree.



figure 7.1: Earth and heaven represented as animal heads coming out of a fig tree, a seal from Indus Valley (Marshall: Plate XC)

7.6: The Giant Tortoise

One popular Hindu myth says that earth rests on the back of a giant tortoise. Another popular myth says that earth rests on the head of a serpent, Sesanaga. Earthquakes are supposed to take place when the tortoise or the serpent moves. Origin of the serpent myth is the story of serpent Vrtra. We will trace here the origin of tortoise myth. Like most of the beliefs of the Hindus, the origin of this myth can also be traced to the Vedas. The Vedas tell us the following:

"Heaven is fierce and earth is firm due to him."

Rgveda 10.121.5, Yajurveda 32.6

We should note here that firm here is used in the sense of being very hard and not as stationary. Heaven (Dyau) is fierce because it is the abode of energy and earth (Prthivi) is firm because it is the abode of matter particles, which do not have wave like characteristics. Prthivi is considered like a tortoise in the Vedic scriptures. Tortoise has a very firm back without any hair on it. The observer space (Prthivi) is firm like the back of tortoise and it does not have hair as well.

"This Prthivi was without hair earlier."

Satapatha Brahmana 2.2.4.3

"This Prthivi is like the back of the tortoise."

Mahabharata, Santiparva, 300.6

Hair refers to the field lines. Even modem physicists use similar analogy when they say that black holes do not have hair meaning that field lines can not emerge from a black hole. Prthivi does not have hair, because hair is characteristic of the field, and Hi© field resides in Antariksa. Vedic ideas were picked up by the

Semitic religions without having any clue as to the real scientific meaning behind these ideas. The Bible also says that earth was bald earlier in Genesis. In India massive efforts were made to the preserve the scientific meaning of the Vedas. The analogy between Prthivi and the back of tortoise was forgotten long time back, and then a myth generated which supposes that earth rests on the back of a giant tortoise and earthquakes take place when the tortoise turns.

7.7: Geocentric Universe

The firmness of earth is referred several times in the Bible, where firmness has been associated with immovability. In Psalm 93.1, 96.10 and 104.5 it is said that earth has been fixed on its foundations and can not be moved. Concept of the firmness of observer space (earth) in the Vedas gave rise to the concept of immovability of earth in Semitic religions, and formed the basis of geocentric universe. In ancient and medieval times ideas after ideas marched from India and some of them were incorporated in the belief system of Semitic religions. According to the Bible and the Koran earth was created before sun. This is the result of confusion that took place in India as the Vedic knowledge was forgotten.

As observer space and light space were separated in the very beginning of creation, it is very difficult to know how the process of separation started.

"Which was born first and which later ? How were they born? Who knows?" Rgveda 1.185.1

Rgveda 10.81.3 clearly states that both of them were born together, but later scriptures seem to be of the opinion that observer space was created first.

"This Prthivi was bom first among the Bhutas."

Satapatha Brahmana 14.1.2.10

"This Prthivi was first created among the Lokas."

Satapatha Brahmana 6.5.3.1

In the Satapatha Brahmana we see Prthivi counted among three spaces (lokas), and as well as among five elements (Bhutas). Confusion of Prthivi with earth resulted in the belief that earth was older than sun, as sun is part of heaven. Prthivi was not hard when it was created according to Hindu scriptures. Earlier it was very soft, which gradually hardened.

7.8: Superspace

Beginning of this century saw the rise of the theory of relativity. Earlier scientists considered space and time as independent of each other. The theory of relativity gave rise to the concept of four dimensional space-time, in which space has three dimensions and time has one dimension. Although mathematically it is easy to incorporate time as one more dimension to space, physically it is not so easy to conceptualize. Though flow of time is affected by the curvature of space, is it strong enough evidence to think of tune as similar to space? We can move forward and backward in space, but we can not move backward in time, and we can move forward in time only at a fixed rate. Why should it be so in a four-dimensional universe is not satisfactorily explained by modem physics.

Once the concept of four-dimensional universe gained ground, scientists tried to further expand it. One of the major triumph of Ae general theory of relativity was that it explained gravitation as the interaction of matter with the curvature of space-time. Soon scientists started to generalize the idea and proposed a universe

of even higher dimensions in order to explain electromagnetic force as another manifestation of the properties of space-time. These universes of higher assumed dimensions are called Superspaces. With the discovery of nuclear forces the number of dimensions needed to accommodate these forces also increased. The theory of Superspaces has not been perfected yet. The reason being that it is not easy to verify these theories. They propose more than one dimension of time, physical meaning of which is unclear. If there are more than four dimensions then why do not we observe them. Scientists believe that some of the dimensions are curled at a very subtle level. If you look at a cylinder, which has two dimensions, from far away, it looks like a line, which has only one dimension. Thus universe could have more dimensions than we are actually aware of. Professor Sylvester James Gates, String theorist at University of Maryland says that those other dimensions are curled up so tight, we'll never have to deal with them. Scientists have found that in order for Superspace theories to work, these spaces must have at least ten dimensions. We should recall that according to the Rgveda, the outside of the universe is ten-dimensional. Clearly, the universe is a Superspace in the framework of the Vedic cosmology. The Vedas imagine the inside of the universe to be different than outside. Inside of the universe is divided in the observer, intermediate and light spaces, each of which has only seven dimensions.

"Seven were its enclosures (Paridhi), three times seven were made firelogs (Samidha)." Rgveda 10.90.15

Here seven firelogs refer to seven dimensions each of the three spaces. Seven enclosures refer to curled dimensions. Vedic scientists had a clear conception of the geometry of the universe, and therefore we find exact numbers in the Vedas. The meaning of all these numbers is not clear to me at the present time. What is clear is that Vedas form the basis of Hindu way of life. The

fscience of the Vedas has been incorporated in Hindu customs, so that Hindus do not forget the science behind. One of the most beautiful expressions of Vedic science is the custom of going round the fire seven times by the bride and groom during marriage ceremony. In Vedic science the dimensions are called firelogs, meaning energy resides in them. The seven rounds around fire represent the seven curled dimensions of observer space. We have an explicit reference to the curled dimensions in following mantra.

"Directions are enclosed metres."

Satapatha Brahmana 8.5.2.3

There are seven prominent metres and in this mantra they are related to the seven dimensions of observer space. The Vedas consider dimensions to exist inside and outside the universe, and also consider the dimensions to have magnetic properties.

"Directions are inside the universe and outside as well."

Satapatha Brahmana 6.5.2.7

"Directions have properties of iron."

Satapatha Brahmana 13.2.10.3

Here by iron, magnetic properties are meant. We should note that apparent meaning of these mantras makes no sense at all. Once we know the scientific meaning of these mantras, then these mantras reveal the mind boggling achievements of Vedic sages.

7.9: Trisira Visvarupa

One of the legendary deeds of Indra is the slaying of Visvarupa, son of Tvasta. Following two verses from the Rgveda describe this legend).

"Instigated by Indra, he Aptya (Trita), knowledgeable of forefather's weaponry, fought for long period. Trita killed the three-headed with seven rays, and obtained the cows of Tvasta's son"
Rgveda 10.8.8

"Indra, protector of truthful people, shattered very strong and haughty. He, calling the cows, cut three heads of Tvasta's son Visvarupa." Rgveda 10.8.9

Trisira means three-headed and Visvarupa means shape of universe. The three heads of the universe are the end points of Prthivi, Antariksa and Dyau. As each of these three spaces exist at every point in universe, these three exist at the boundary of the universe as well. Thus killing of Trisira Visvarupa is the same as that of killing of Vrtra, and both represent the expansion of the universe. Seven rays of Trisira Visvarupa are the seven dimensions of the universe. Figure 7.2 shows Trisira Visvarupa as found on a seal of the Indus Valley Civilization. Some scholars have tried to explain the three heads of the animal as only one head in three different positions. This explanation is the result of their unfamiliarity with the Rgveda or their prejudice in considering the Indus Valley people different from the Vedic people.

In the Aitareya Brahmana, Indra kills three-headed son of Tvasta named Vairupa. Vairupa was considered a Brahmana, and Indra commits a grave sin by killing him, so that he had to atone for it. A parallel myth is found among Greeks as well. Apollo also commits a sin by slaying Pytho the dragon and had to be purified. What is important is that this story of atonement is not found in the Vedas. Thus Greeks borrowed their myths not from the Vedas, but from the Brahmanas which had been written and spread all around the globe before Greek Civilization came into being.

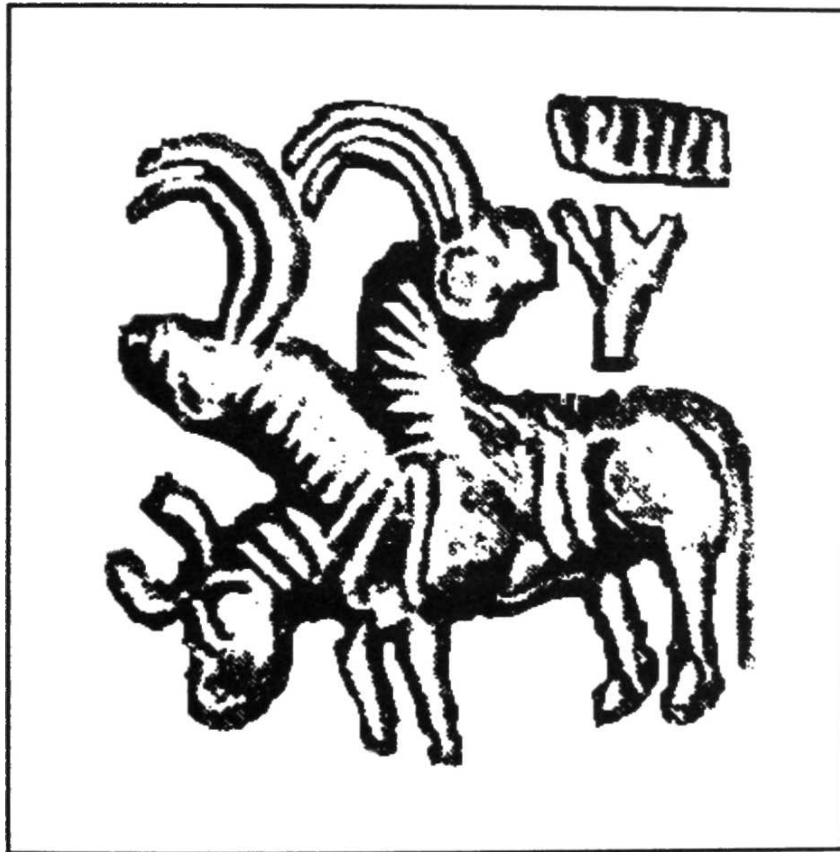


Figure 7.2: Trisira Visvarupa, a seal from Indus Valley (Marshall: Plate CXII)

7.10: Dark Matter

One of the key features of the Big Bang Cosmology is dark matter. The universe is supposed to have a theoretical mass-energy density in order to have existed for so long, and on the other hand observed mass-energy density is far lower than that. Most observations put the observed density at 10 % of theoretical density. So what happened to 90 % of the mass-energy that should be there, but is not really there? Scientists have given this missing mass-energy the name dark matter. At present scientists have no clue as to what could be dark matter.

One popular theory is that dark matter consists of massive neutrinos. The neutrinos that scientists are familiar with have no mass or very small mass. On the other hand dark matter has to be taken into account, as its gravitational pull affects the evolution of the universe. Vedic sages were also very familiar with the concept of dark matter. The Rgveda talks about the dark matter in the following verses:

"All that is born, is his one fourth, his three fourth is immortal in heaven." Rgveda 10.90.3

"Three-fourth of Purusa is above, his one fourth is born again and again." Rgveda 10.90.4

"Speech has four quarters, which knowledgeable people know. Three of them are hidden and not known by people. People speak only the fourth one." Rgveda 1.164.45

The first two verses establish that only 25 % of mass-energy is located in the observer space, while 75 % of mass-energy is located in the light space. Our measurements can reach only 25 % of the total mass-energy of the universe. It is this 25 % of mass-energy that keeps being created and annihilated as particles

in observer space. The third verse refers to the same phenomenon, however it gives the name speech to the mass-energy of the universe. The Vedas talk about the same phenomenon in various forms as illustrations so that key concepts are not forgotten. It is

very clear that the Vedas consider 75 % of the mass-energy of the universe to be located in the light space in the form of pure energy. In Hindu scriptures earth and heaven together with fire, air and water form the five elements from which everything in the universe is made. As modern science has shown, the idea of these five elements constituting the universe is very primitive. Now that we know the real scientific meaning of some of these elements, we are in a position to appreciate the thinking of the Vedic sages. We will now discuss in more detail the scientific jmeaning of the rest of the elements, and find out that the ingredients of everything in the universe are indeed five elements.

The essential reality is a set of fields."
- Steven Weinberg

8. Return of the Elements

In ancient India concept of five elements was very well known. These five elements were earth, water, sky, fire and air. Greeks borrowed this concept from India, leaving out the sky element. The concept of sky as an element was considered very abstruse by Greeks. The scientific meaning of these elements was quite different from their apparent meanings. These five elements in technical terms are Prthivi (earth), Apah (water), Dyau (sky), Agni (Fire) and Vayu (air). We have already met three of these elements, Prthivi, Dyau and Vayu in the previous chapters. We will discuss the meaning of Agni and Apah now.

84: Agni (Fire)

Agni means one that leads. Related word "Agra" in Sanskrit means front. Agni is the most important diety after Indra in the Rgveda. Ail books except one in the Rgveda start with hymns

dedicated to Agni. Sanskrit Agni became Ignis in Latin, Ugnis in Lithuanian and Ogni in Slevanic. Agni in scientific terminology is "Energy". In Rgveda 2.10.6 Agni is called full of honey. The meaning of this mysterious verse will become clear, when we discuss honey later in this book. Agni is described as having three forms in the Rgveda, and sometimes the other two forms are called brothers of Agni.

"Immortals purified three brilliant forms of Agni. Out of them one who eats was placed where death is inevitable, other two went in sibling spaces." Rgveda 3.2.9

These three forms are Agni, Vayu and Surya. Division of universe in three spaces is the basis for three forms of Agni. Agni is called Agni in observer space, and this is the space where matter particles take birth and die. Agni is called Vayu (field) in intermediate space, and field is only another form of energy. Agni is called Surya in light space.

8.2: Apah (Water)

Apah means what pervades, and if there is any confusion as to the extent of this pervasion, the Rgveda clears this confusion in the following mantras:

"Waters pervade the whole universe, which hold fire in its womb. There exists the one lord of all gods, for which god should we offer oblation." Rgveda 10.121.7

"Apah held universe in its womb." Rgveda 10.82.6

Apah are everywhere in the world, and there is Agni residing m the Apah. As Agni has been identified with energy, Apah is

certainly manifestation of energy. To get further insight in the concept of Apah, it is time to recall a mantra from the Satapatha Brahmana.

. "Apah were indeed Salila earlier." Satapatha Brahmana 11.16 1

Salila has been identified with undifferentiated primordial fluid. So what happens when the undifferentiated gets differentiated? There is a polarization and formation of opposites. Scientifically Apah is the soup of matter-antimatter particles that pervades the universe. Matter and antimatter can be considered polarization of energy. When a particle meets its anti-particle, it changes into energy. Once Apah is identified with matter and anti-matter, energy (Agni) clearly resides in it, and a great Vedic ttt puzzle has been solved. Vedas repeatedly mention fire residing ii in waters, which apparently makes no sense as water is used to ooooo quench fire. Now is the perfect time to read a beautiful hymn dedicated to goddess Apah.

Rgveda 7.49

Sage: Maitravaruni Vasistha; Deity: Apah; Metre: Tristupa

1. From the middle of Salila, great among seas, purifying Apah keep flowing without resting for a moment. Whom bull Indra, who holds Vajra, digged to flow, goddess Apah help me here.
2. Those from heaven or those which flow, those from well or, those self-born, those purifying Apah going to sea, goddess Apah help me here.
3. Whose king Varuna moves in the middle observing the truth and lies of people, which drips honey, which is clean and pure, goddess Apah help me here.
4. In which king Varuna and Soma are, where all the gods get their ,in which Vaisvanara Agni has entered, goddess Apah help me here.

In these verses a clear relationship is made between Apah and Indra, Varuna, Agni and Soma. We are now in a position to understand the relationship between Apah, Indra and Agni, and meaning of the rest of the relationship will become clear when I discuss Varuna and Soma.

The Padma Purana, in the twenty fifth chapter of creation canto, tells the following story about the dwarf incarnation described earlier. Daitya (demon) Vaskali became very powerful because of a boon given by Brahma. Indra asked for land from Asuras and said,"Brahmana (Visnu) is born in the lineage of Kasyapa. He asked me for land equal to three steps, but I do not have anything. Please fulfill his desire". Vaskali's priest Sukracarya tried to stop him, but Vaskali agreed anyway as there was a custom to never let a Brahmana return empty-handed. Visnu put one step in Surya (sun) loka, another in Dhruva (fixed) loka, and with his third step he hit the cover of the universe. A hole developed in the cover and a profuse amount of water gushed in the universe from outside. This water took the form of Ganga (Ganges) river and therefore is famous in the world as VisnupadI, meaning born out of the feet of Lord Visnu. This concept of water gushing in from the outside of universe has been borrowed by Semitic religions. The Bible (Genesis 7.11-12, 8.2 and Malachi 3.10) talks about the windows of heaven, which God opens to let the water from outside gush in.

The water that Hindu scriptures refer to is not water, but matter and antimatter that constitute the universe. Hole in the cover of the universe refers to the surface of the universe being broken by the expansion of the universe. According to Hindu scriptures when the water from outside gushes into the universe, it takes the form of Ganga river, which falls on the lock of hair of Lord Siva, and then is transferred to earth. For this reason Ganga river is represented as coming out of the lock of hair of Lord Siva. To understand the science behind this representation, we have to discuss the Rgvedic form of Lord Siva, that is Rudra.

8.3: Rudra

There are three complete hymns dedicated to Rudra in the Rgveda * (1.114, 2.33, 7.46). As the universe expands, matter-antimatter is created at the surface of the universe. The matter-antimatter then starts to travel inside the universe. However matter and antimatter can not continue their journey, as they annihilate each % other. As matter and antimatter annihilate each other, they change to into radiation. This radiation is called Rudra by the Vedic to scientists. Rudra means what makes one cry, which refers to penetrating brightness of radiation. Earth and heaven together are called Rodasi, meaning crying, referring to their being filled up with radiation.

The concept of Vedic god Rudra later developed in the form of Lord Siva in the Puranas. Siva is considered the god of K annihilation, which is only appropriate. When particles are annihilated, they change into radiation. Lock of hair of Lord Siva is Vayu, as Vayu consists of field lines. Lord Siva is very kind, but at times he becomes very furious. He has similar attributes in the Vedas. Radiation can be soothing or penetrating depending on intensity. In the Rgveda Rudra is sometimes used in singular case and sometimes in plural case. It seems that the Vedic sages divided radiation in various categories depending on intensity, and used singular case when considering radiation as a whole or 0 used plural case when considering differing intensities of radiation. Bow and arrow is the weapon of Rudra in the Rgveda. In the Yajurveda, the character of Rudra develops further. Sixteenth chapter of the Yajurveda is called Rudradhyaya, and contains beautiful description of Rudra. He is called Sambhu, Sankar and Siva, the names by which he is known today. In the Rgveda Rudra is not shown assisting Indra, and therefore proponents of the Aryan Invasion Theory claim that Rudra was a Dravidian god. They conveniently conceal that in the Rgveda sons of Rudra, Marutas, are described helping Indra.

8.4: Maruta (wind)

There are twenty nine complete hymns dedicated to Marutas in the Rgveda (1.37-39, 1.64, 1.85-88, 1.166, 1.168, 1.172, 2.34, 5.52-59,6.66,7.56-58,8.7,8.20,8.94,10.77-78). Marutas (winds) are called the sons of Rudra (Rgveda 1.64.12). Marutas are seen as helping Indra in slaying of Vrtra (Rgveda 1.165.7). You have already seen that the slaying of Vrtra is the expansion of the universe. What role do Marutas have to play in the expansion. I will illustrate this point with the example of a balloon. Consider the balloon as representing the universe, and we are considering here the entire balloon not just the surface. To expand the balloon, you blow air into it. What does the air do? It increases the pressure inside which expands the balloon. Now consider the universe which is being filled by radiation as matter and antimatter annihilate each other. This radiation creates a pressure, radiation pressure, and this radiation pressure expands the universe. I will identify Marutas as radiation pressure. As Rudra is radiation, and radiation pressure (Marutas) results due to radiation, it is only appropriate to call Marutas sons of Rudra.

Pressure has a very important property. At any point in space, pressure is same in all directions. Pressure is a tensor quantity like stress. In a three-dimensional space, stress has nine components. Nine components arise by squaring of three, the number of dimensions in space. If we have a higher dimensional space, number of components of stress will simply be square of the number of dimensions. We have already seen that Vedic scientists consider inside of universe to be of seven dimensions, and therefore pressure will have seven cross seven, forty nine components. This is exactly the number of Marutas, forty nine and they are also supposed to move in seven rows, each row having seven Marutas (Rgveda 5.52.17). Rgveda contains a beauty dialogue between Indra and Marutas. Indra sees the Marutas says few words in their praise. Marutas become haughty to hear

that and despise Indra. This makes Indra furious and he starts describing his glories. Finally Marutas relent, and accept the superiority of Indra. Indra and Marutas then resume their friendship.**iii**

Rgveda 1.165

Sage: 1,2,4,6,8,10,11,12-Indra, 3,5,7,9-Maruta;
Deity: Marutvanindra; Metre: Tristupa

1. Indra: Having same age and same abode, equal in all respect, ***m*** with which auspicious brilliance do Marutas sprinkle together? What is their desire? Where do they come from? Rain producing Marutas worship strength to acquire wealth. **||**
2. Indra: Whose hymns of praises do the young ones enjoy. Who turns in non-violent sacrifice? With which great thoughts can I make them happy who move in atmosphere like eagles?
3. Maruta: O Indra, where do you go alone even though you are great? O protector of truthful people, why are you in such a condition? Walking together we ask you, owner of horses, whatever you want to say, say to us in beautiful words.
4. Indra: Praises, thoughts and Soma provide me happiness. My strength is well known. Praises come to me. Let my two horses take me there directly.
5. Maruta: Therefore we have adorned our bodies with our strength, and joined with near ones. We have come to you. O Indra, make your strength favorable to us.
6. Indra: O Marutas, where was your strength, when I was left alone to slay the serpent. I am fierce, strong and great. I have killed all the enemies.
7. Maruta: O Bull, you have performed many great deeds, but we have also contributed to that by joining forces with you. O mighty Indra, we have also done many great acts. Marutas work to get what they desire.

Indra: O Marutas, I killed Vrtra and became strong on my

own. I hold Vajra in my hand. I have created the flowing waters, which give happiness to all.

9. Maruta: O Maghavan (wealthy), there is nothing that has not been instigated by you. There is no other learned god like you. 0 great Indra, the deeds you have performed and will perform, neither anyone else has done it nor will be born to do it.
10. Indra: Whatever I want to do, I put my mind into it. The vigor of me alone spreads in all directions. O Marutas, I am fierce and learned. Wherever I go, I become the lord of that place.
11. Indra: O friend Marutas, the praises you made for me here have made me very happy. You have strengthened my body by your bodies. You have done it for rain producer, sacrificer Indra.
12. Indra: O Marutas, be friendly to me the same way. Hold praiseworthy wealth and food. Aim for me and cover me with glory, O beautiful Marutas.

All Marutas are of same age, none of them is younger or older (Verse one). We immediately recognize that this refers to pressure being same in all directions. Marutas belong to intermediate space (Verse two). Maruta and Vayu both are synonyms, and it is only expected that they will belong to intermediate space. Indra killed the serpent alone (Verse six). This refers to the initial moments of creation. As there was very little matter and energy in the universe then, electric force alone was responsible for expansion of the universe. Once universe had sufficient matter and energy, then Marutas joined hands with Indra to expand the universe. Marutas wear gold ornaments on their chests (Rgveda 5.55.1, 5.57.5). This refers to Marutas carrying energy with them. In the Rgveda characters of Maruta and Vayu are very distinct. Vayu has neither been called son of Rudra nor told to be more than one. The Rgveda is a book of science, and once we understand this, then we will see clearly that different terms in the Rgveda have different scientific meanings. The Rgveda is a coded book, and water of the Rgveda does not mean water and rivers of the

Rgveda do not carry water. The most prominent river in the Rgveda is SarasvatI, and it is time to discuss the concept of Sarasvati in greater detail.

8.5: Sarasvati

Two complete hymns have been dedicated to Sarasvati in Rgveda (7.95 and 7.96). Sarasvati has been worshipped as the goddess of learning in India. Sarasvati was also a mighty river in India during the Vedic age, which dried up later. How did Sarasvati become associated with speech and river, two widely different concepts? The answer lies in the scientific symbolism of the Rgveda, where hardly any word means what it is supposed to mean if you consider the apparent (rudhi) meaning of the word. On the other hand, every word in the Rgveda means exactly what it is supposed to mean, if you consider the etymological (yaugika) meaning of the word. Speech (Vak) is considered sacred in India and is another form of God. The Rgveda itself attests to the equivalence of speech and God in the following verses:

"All that is bom, is his one fourth, his three fourth is immortal in heaven." Rgveda 10.90.3

"Three-fourth of Purusa is above, his one fourth is bom again and again." Rgveda 10.90.4

"Speech has four quarters, which knowledgeable people know. Three of them are hidden and not known by people. People speak only the fourth one." Rgveda 1.164.45

The equivalence of Speech and God is described in the Bible as well. Is it any wonder that Speech says the following about herself in Rgveda 10.125.1?

"I walk with Rudras and Vasus. I live with Adityas and all the gods. I hold Mitra and Varuna. I hold Indra, Agni and both Asvins."

Sarasvati became the goddess of learning because of her association with Speech. The Brahmana texts emphasize this aspect again and again.

"Speech is Sarasvati." Satapatha Brahmana 2.5.4.6, 3.1.4.9,4.2.5.14, Taittiriya Brahmana 1.3.4.5,3.8.11.2, Aitareya Brahmana 2.24

Ila, Sarasvati and Bharati form a triad in the Rgveda. Sayana in his commentary on Rgveda 1.142.9 places Ila in Prthivi, Sarasvati in Antariksa and Bharati in Dyau. This view is further supported by the Rgveda itself. In verse 2.30.8 Sarasvati is asked to join with Marutas, and Marutas belong to intermediate space. In verse 7.96.2 Sarasvati is called friend of Marutas. Pururava is called son of Ila in Rgveda 10.95.18, and in the same hymn Pururava is depicted as a mortal. Death of particles takes place in observer space, so Ila belongs to Prthivi. Thus speech (Vak) is the total mass-energy of the universe, and Ila, Sarasvati and Bharati are the respective portions of mass-energy in the observer, intermediate and light spaces.

There is one important point to be discussed here. Space is divided in three, and these three spaces have different volumes, the intermediate space having the smallest volume as it is only an interface between the observer and light spaces. Another way of division is not according to volume, but content. Observer and light spaces may have same volume, but there mass-energy contents may be vastly different. Confusion arises when these two different concepts are equated. Speech has traditionally been divided in three categories: Pasyanti representing Bharati, Madhyama representing Sarasvati, and Vaikhari representing Ila.

Madhyama means intermediate, and thus Sarasvati belonging to intermediate space gets further support. However, in Rgveda 1.164.45 quoted above, Speech is said to have four quarters, and confusion runs amok. Sayana in his commentary on this verse adds another form of speech called "Para" and brings the total to four. Speech (Vak) of the Rgveda has nothing to do with speech, as it represents the total mass-energy of the universe. Verses 10.90.3-4 and 1.164.45 are saying that 75 % of total mass-energy is in the light space and only 25 % is in the observer space. In this consideration, intermediate space becomes part of light space, as both of them are hidden. Intermediate space being only an interface, counting of it as a separate phase is optional. When the Rgveda talks about this four-fold division, it is based on content, and when the Rgveda talks about three-fold division it is based on extent.

Sarasvati has been called fortress of iron in Rgveda 7.95.1. This description neither fits Sarasvati as speech nor it fits Sarasvati as a river. Some western scholars like Max Muller justify this epithet by saying that wide river Sarasvati protected India from invasion. However, this justification does not fit well with facts. Western boundary of India has traditionally been Indus river and not Sarasvati. A large number of cities belonging to the Indus Valley Civilization have existed on both sides of Sarasvati. Thus Sarasvati could have nourished the Vedic civilization, but not protected it. The scientific explanation is that iron represents magnetism everywhere in the Rgveda, and as Sarasvati represents the flow of matter and energy, it has magnetic properties.

Now that the relationship of Sarasvati with Speech is clear, it is time to discuss the relationship of Sarasvati with river. Sarasvati has been called as one having seven sisters in Rgveda 6.61.10. These seven sisters are commonly counted as seven rivers of northern India and Pakistan. However, there are so many rivers in this region, and why would only seven be chosen? Number seven has a special significance in the Rgveda as in seven sages,

seven enclosures, seven metres, seven cross seven Marutas and so on. This will be too much of a coincidence, if there are exactly seven rivers as well. Sayana gives a clue when he says that Gayatri etc. metres are seven sisters, and similar to them Ganga etc. seven rivers are seven sisters. Thus seven sisters of Sarasvati are seven dimensions of intermediate space. It is for this reason that Sarasvati makes a triad with Ila and Bharati on one hand, and makes a group of seven rivers with Ganga, Indus and other rivers on the other hand. Universe has three spaces and each space has seven dimensions, and Sarasvati forms a group of three or seven corresponding to the number of spaces or dimensions.

In the Rgveda Sarasvati is not a river carrying water. Rgveda uses objects familiar to the Vedic people, and uses them in an entirely different context. There is little doubt that a river named Sarasvati existed during Vedic times, but to try to get further information about river Sarasvati from the Rgveda is a futile exercise. What the Rgveda has to say about Sarasvati can never apply to a river. In Rgveda 7.95.2 Sarasvati is said to flow from ocean. The word used is "Samudrat" meaning from ocean, and not into. No river on earth does that. Also, Sarasvati is well accepted to belong to intermediate space, so she does not flow on earth at all. The rivers of the Rgveda are not rivers of water. Matter and energy is created at the boundary of the universe, and it starts its journey towards the center of the universe. This flow of matter and energy is termed rivers in the Rgveda. This representation fits well with the code of the Rgveda, as Apah (water) of the Rgveda is in fact matter and antimatter. This flow of matter and energy is taking place in all three spaces. Matter and energy can be also considered to flow along the seven dimensions of each space. Thus total number of rivers in the Rgveda becomes twenty one. Here are some verses from the Rgveda to support my argument.

"O rivers (Sindhus), you live in three places."   Rgveda 3.56.5

"Seven rivers are flowing in heaven." Rgveda 1.72.8
"We call three times seven flowing rivers." Rgveda 10.64.8
"Rivers flow seven by seven in three places." Rgveda 10.75.1

As I have earlier noted, only three dimensions of our space are experienced by us. Rest of the four dimensions are referred to as sub-directions and described as existing above. Four rivers representing these dimensions are also described as existing above in the Rgveda.

"Indra filled four rivers flowing above with sweet water."

Rgveda 1.62.6

Another important point is that all seven dimensions exist at each point in space, they just point in different directions. The rivers of the Rgveda also originate from same place, flow together, and end up in the same place. There is no evidence in the Rgveda to show that seven rivers of the Rgveda are separated in space.

"When Vrtra counterattacked, one god Indra became the hair of horse. Mighty Indra won the cows, won Soma, and freed seven rivers to flow." Rgveda 1.32.12

"Who killed the serpent and made seven rivers flow, who got the cows hidden by Bala out, who created Agni between two rocks, who kills enemies in wars, he, O people, is Indra."

Rgveda 2.12.3

These verses show that all seven rivers start their journey from the same place, where serpent Vrtra was killed. Sarasvati, Indus and other five rivers considered to be belonging to this group of seven rivers do not match this description. Consider the

following prayer by sage Visvamitra to the rivers Vipata and Sutudri.

"Coming forth from the lap of mountains desiring (to go to sea) like two joyous horses set free. Like two white cows licking their calves Vipata and Sutudri rivers are flowing full of water."

Rgveda 3.33.1

"Set in motion by Indra you are flowing directly towards ocean like charioteers. Moving in accordance to other, with overflowing waves, shining, one of you meets the other."

Rgveda 3.33.2

"I went near best of mothers Sindhu, Like two mothers licking their offsprings, they move towards same place. I have come near best of mothers Sindhu, I have come near wide lucky Vipata."

Rgveda 3.33.3

These verses describe the rivers as flowing together without any separation. These rivers do not carry water. These rivers represent the flow of matter particles. In the next chapter we will take up the discussion of fundamental particles as found in the Vedas.

"These people go in and out all very nicely dressed.
Do you conclude from this that they swim dressed."
- Heisenberg

"I have seen an untiring milkman, who travels on converging and diverging roads near and far away. He stays inside the world dressed up."
-Rgveda 1.164.31

9. Quark Confinement

Modern physics tells us that matter and energy can be converted into each other, but does not tell us much about the shape of fundamental particles and whether there are any stages between the transformation of matter particle into energy. Fundamental particles are considered point particles which have zero length and volume, but possess mass, momentum and charge, thus making the mass-energy and charge density infinite for the point particles. When a property tends to infinity, physicists call it a singularity. Modern particle physics is then a mine of moving singularities. Physicists dislike singularity, because it is difficult to handle and conceptually meaningless. They have come up with smart ways to avoid singularities, but that can not be considered

a solution. This is the result of modern science reaching the limits of detection. These limits have become so obvious that a controversial book "The End of Science" has been written[l].

However, the approach of modern science is not the only way to investigate the ultimate reality. The analytical approach of modern science has limitations, and Vedic physics goes beyond these limitations as the Vedic scientists have seen whatever can be seen in this universe. It is only appropriate that the Vedic scientists gave the name Pasu to whatever could be seen.

9.1: Particle

Pasu is derived from root "Pas" meaning to see. That is why Purusa was termed Pasu when he changed his form from unobservable to observable. The primary meaning of Pasu is animal. That Pasus are related to being observable, and nothing to do whatsoever with animals in their intended meaning, is clearly seen in the Satapatha Brahmana.

"Prajapati saw Agni in those Pasus, therefore they are called Pasus." Satapatha Brahmana 6.2.1.1-4

This mantra also shows explicitly the equivalence of particles (Pasus) and energy (Agni). There are several mantras in Vedic

scriptures to this effect.

"Agni was Pasu." Yajurveda 23.17

"Pasus are Agneya." Taittiriya Brahmana 1.1.4.5

Agneya means having the quality of Agni. Earlier, the reader has seen that Maruta are related to radiation. Vedic sages knew perfectly well that particles radiated energy

"Pasus are Maruta." Aitareya Brahmana 3.19

"Pasus are Agneya and Maruta." Jaiminiya Brahmana 2.231

Maruta means having the quality of Maruta. The transformation of matter particles into energy and energy into particles is well established by these mantras.

9.2: Bosons and Fermions

How did particles originate? The Purusa hymn describes the origin of particles (Pasus) in the following verse.

"From that Yajna of entire offering coagulated butter (or butter mixed with curd) was obtained. Vayavya, Aranya and Gramya animals (Pasu) were made." Rgveda 10.90.8

Coagulated butter refers to the universe becoming inhomogeneous. In earlier state universe was Salila, completely j. homogeneous. With the rise of inhomogeneity, particles were formed. Particles can be thought of as condensation of energy. Particles were given the name Pasu because they could be seen. Primary meaning of Pasu is an animal. Animals have been classified under three categories: Gramya, Aranya and Vayavya. Gramya animal means those animals which prefer to stay together or domestic animals. Grama is a word in Sanskrit which means a village called so because people live together there. As opposed to Gramya, Aranya means wild animal, derived from Aranya meaning forest Wild animals prefer to stay alone. Knowledgeable readers will come to the conclusion that Gramya particles are what physicists call bosons and Aranya particles are what physicists call fermions. Vayavya means pertaining to Vayu. I have already identified Vayu with field, so Vayavya particles

can be called field particles. Field particles are related to how particles interact with each other. Earlier scientists believed in the principle of action at a distance. Particles just interacted with each other without any intermediary and interaction was instantaneous. Newton was the champion of this school of thought. Later scientists hypothesized that particles interacted with an intermediary called field. Interaction is not instantaneous and the highest speed of interaction is the velocity of light. Einstein was the champion of this school of thought. Scientists in last few decades have come up with the idea of field particles, and under this concept particles interact via the exchange of field particles. Electromagnetic interaction takes place by the exchange of photons. It is evident that the Vedic scientists considered field to act via field particles and knew five thousand years ago what scientists are beginning to realize only now.

Gramya particles are further divided in four types: Aja meaning goat, Avi meaning sheep, Asva meaning horse and Gau meaning cow. This is again described in the Purusa hymn.

"From that horses were born, who have teeth on both sides. From that cows were born, from that goats and sheep were born."

Rgveda 10.90.10

It is important to note here that only these four domestic animals find repeated mention in the Rgveda. Cat, for example, is not mentioned in the Vedas. Cows are hidden in the mountains, horses drive the chariot of the gods, wool of sheep is used to strain Soma juice and goat is the vehicle of Pusa. All of these have a precise scientific meaning. The choice of these four animals to represent four Gramya particles is not arbitrary, which will become evident soon. Aja means not born. Sometimes Aja is also referred to as Ekaja meaning once-born. Aja is the intermediate step between the transformation of energy into particle. I will translate Aja as localized energy. Aja is almost

like energy, and that is why it was given the name not-born, however some change has taken place which could not escape the attention of the Vedic scientists. You should recall that energy is considered immortal in Vedic science, and therefore not-born. "Aja then transforms into Avi, Asva or Gau particle. As Avi, Asva or Gau particle are born from Aja, these three particles can be considered twice-born with Aja being considered once-born. The confusion between animals and particles gave rise to a hierarchical division of Hindu society.

9.3: Once-born and Twice-born

i

Hindu society is divided in four classes (Varna): Brahmana, Ksatriya, Vaisya and Sudra. This division existed in Vedic age, which is evident from the reference to these Varnas in the Purusa hymn. However, Varna system was not based on birth in Vedic age. In post-vedic times, four Varnas became representative of four Gramya animals. Brahmana became representative of cow (Gau), Ksatriya became representative of horse (Asva), Vaisya became representative of sheep (Avi) and Sudra became representative of goat (Aja). This representation, though not unique, is very well accepted in post-vedic literature. Satapatha Brahmana 13.2.2.15 says that horse is Ksatriya. It also says that cow was born from the mouth of Prajapati (12.7.1.4), and the Purusa hymn says that Brahmana was bom from the mouth of Purusa (Rgveda 10.90.12). Thus cow became representative of Brahmana. The Vedas ban the killing of cows. It is for this reason that killing of cow or Brahmana became the greatest sin in post-vedic Hinduism. Once these identifications gained ground, Sudra became once-born and rest of the three Varnas became twice bom. Second birth commenced with the rite of Upanayana and study of the Vedas was taken up only after Upanayana. As Sudras were deprived the rite of Upanayana because now they were not

twice-born, they also lost the right to study Vedas. This was one of the most unfortunate development in Hindu society and Hindus have paid a very heavy price for this institutionalized inequality. If a corrective step is not taken today, this inequality may finish Hinduism altogether.

9.4: The Flying Horse

Avi (sheep) particle is given this name, because this particle closely resembles field. Sheeps are covered with wool, and similarly Avi particles are covered with dense field lines. Soma is repeatedly described as being strained through sheep's wool in the Rgveda, which means the passage of Soma through field lines of Avi particle.

Asva (horse) particle is given this name because of the fast speed of horse. Asva is often described in the Rgveda as travelling faster than thoughts. Gau (cow) particle gets its name because it emits radiation like cow gives milk. These particles could not have meant animals by any stretch of imagination is obvious from even a cursory reading of the Rgveda. I am translating here a full hymn dedicated to Asva particle to show that Asva does not mean horse in the Vedas.

Rgveda 1.163

Sage: Dirghatama Aucathya; Deity: Asva; Metre: Tristupa

1. When you roared springing from sea or land after birth, your great birth is worthy of praise. You have wings of eagle and arms of deer.
2. This horse was given by Yama, Trita harnessed it, Indra captured him first, and Gandharva held its reins. Vasus made this horse from sun.
3. You are Yama, you are Aditya, you are Trita by a hidden act,

you are well associated with Soma. You have three bindings in heaven, it is said.

4. You have three bindings in heaven, you have three bindings in waters, you have three bindings in sea. Tell me, Varuna, where was your most excellent birth.
5. O horse, these are your purifying regions, these are impressions of your feet related to sacrifice. Here I have seen your auspicious reins, which protect universal law.
6. I recognize your soul in my mind from faraway coming down from heaven like a flying bird. I have seen your head going through easy to travel roads without dust like a bird.
7. I have seen your beautiful form eager to eat food in cow's foot, (here cow's foot is normally translated place of earth as earth is one of the meanings of cow in post-vedic litearature). When your mortals received the enjoyment, then you greedy ate the herbs.
8. O horse, chariot follows you, men follow you, cows follow you, luck of young ladies follows you. Those following the laws follow you desiring your friendship. Gods follow you measuring your strength.
9. His horns are golden, his feet are of iron, he is faster than mind and even Indra, who first mounted him, was lower than him. Gods come to partake his oblation.
10. The horses are full-haunched, slender-waisted, fiery, heavenly courser. When they travel along the heavenly path, they move in rows like swans.
11. O horse, your body is made for flying, your mind is rapid as wind. Your beautiful horns are placed in various ways and travel in forests.
12. Strong horse goes for slaughtering meditating upon the gods. His navel goat is led ahead, praisers and poets follow him.
13. The horse goes directly to his father and mother in the most excellent place. Go to the gods happily today. May the donors receive wealth.

This certainly is no ordinary horse. Either the sages were drunk as modern historians tell us, or they are describing what Asva particle is precisely. The picture certainly is of a flying horse. Flying is referred explicitly in verse six, ten and eleven. In verse one wings are mentioned. Flying will apply exactly to a fundamental particle. In verse two and three Asva particle is associated with Trita. Trita became King Triton in Greek mythology. Trita is referred to as a king in the Rgveda as well. Trita means one third, and was given this name because Trita refers to one third electric charge. I will identify Asva as one of the quark particles. Modern scientists have very recently found that quarks carry one third electric charge only. An electron or a proton carries one unit charge. Verse three tells that Asva is Trita by a hidden act. Vedic sages clearly know that quarks can not be observed in isolation, that there actual form is always hidden. Calling Asva by the name Trita means that Asva particle carries one third charge. Verse twelve and thirteen apparently describe horse sacrifice. This is not an actual sacrifice, but the transformation of Asva particle in energy, and that is why horse (Asva) is supposed to go to gods (energy). In verse twelve Aja is called the navel of Asva particle. Navel means center, and here it denotes the fact that Asva particle is made from Aja. Goat is said to be led ahead of horse in the sacrifice. Scientifically, this signifies that before transformation into energy Asva particle becomes Aja. Thus the process of transformation in the Vedas is from energy to Aja, and Aja to particles, and then back to Aja, and Aja to energy. This process of creation and annihilation of particles carries on continuously.

The horns of horse are referred in verses nine and eleven. Horns are golden signifying that particles can be transformed into energy. Horses don't have horns and therefore horns are translated as ear or mane, but the word used in the Rgveda is Srnga, which means horn and not ear or mane. This description was deliberate to distinguish Asva particle from animal horse, as

a very poor fate awaited the animal. Vedic literature talks about the sacrifice of Gramya animals (cow, horse, goat and sheep), and any confusion between apparent and intended meaning would bring horrible cruelty to these animals. Despite the best efforts as; of the Vedic scientists the horrible practice of animal sacrifice gained ground.

9.5: Animal Sacrifice

Particle physics is a branch of modem physics that has fascinated both layman and experts in this century by the extraordinary, discoveries. Particle physics interests all of us because it is about knowing what the universe is made of, and might someday explain what our consciousness is made of, what makes us aware. Particle ', physics owes its beginning to John Dalton, who in 1808 proposed j the atomic theory of matter. According to his theory matter was composed of atoms. Atoms of an element combined with atoms

of another element to form compounds. Towards the end of nineteenth century, J. J. Thomson discovered electron, one of the building block of atoms. The discovery of other two building to blocks of atom, proton and neutron, took another thirty five years. With the discovery of neutron in 1932, a nice and perfect picture of atomic world consisting of electron, proton and neutron emerged. However, soon this picture was shattered with the discovery of a number of new sub-atomic particles. Particle physicists continued to discover new particles, and soon their number reached more than hundred. The picture started to grow complex instead of becoming simple. Were all of them fundamental particles or even these particles were made of smaller building blocks. These particles are categorized in bosons, living together, and fermions, living alone. Fermions are further divided in two groups, baryons, which are affected by strong force, and leptons, which are not affected by strong force. Similarly bosons

are further divided in two groups: mesons, which are affected by strong force, and intermediate bosons, also called gauge bosons, which are not affected by strong force. Proton and neutron are baryons, electron and neutrinos are leptons, and photon is gauge boson. Baryons and mesons, both of them affected by strong force, are collectively called hadrons. In 1964 scientists M. Gell-Mann and George Zweig proposed that hadrons were made up of three fundamental particles. These particles were given the name quarks, and later their number rose to six with the discovery of new particles. There is something very strange about quarks. They don't exist by themselves. They are always combined with other quarks. Efforts to isolate the quarks are futile, because to break quarks, they need to be bombarded with high-speed particles and the energy of these particles is transformed into making quarks. Quarks can be thought as ends of a string, if you cut the string, you make two new ends again. Gramya Pasus can be identified with quarks. They can not exist alone. They are always in a form different from what they actually are. In effect their actual form has been sacrificed. Modern physicists call this phenomenon "quark confinement" and Vedic scientists called this phenomenon "Pasumedha" meaning animal sacrifice. The sacrifice in Vedic science means a change of form, and has nothing to do with actual human or animal sacrifice. For this reason, in the Rgveda, Yajna has been called Adhvara at several places. Adhvara means without violence, and actual animal sacrifice can not be performed without violence. As we saw earlier for the reason that humans or animals may not be sacrificed by confusion with Purusamedha, Vedic scientists allowed the depiction of the Purusa animal only as a mythical unicorn. What could they do to prohibit animal sacrifice? The Indus Valley Civilization was spread over a large area, and animal sacrifice could take place in remote areas. Cruelty to animals was unacceptable to Vedic scientists having reached such a high level of intelligence, and therefore they took a very extreme step. They completely banned the depiction of Gramya animals,

I cow, horse, goat and sheep. This is the reason there are no figures found of these four animals in any seals of the Indus Valley Civilization. The absence of horse depiction was noted by the proponents of the Aryan Invasion Theory. They tried to prove mat horse was not known in the Indus Valley Civilization and it was brought into India by invading Aryans. Now we know the actual reason for this.

We should note that only quarks are always dressed, other fundamental particles like leptons can be isolated to be observed naked. Similarly only Gramya animals are sacrificed, Vayavya and Aranya animals are not sacrificed.

9.6: Quarks

There is an interesting story about the creation of charged particles in Satapatha Brahmana 1.2.3.1-2.

"Agni was earlier of four types. First one chosen for sacrifice fled. Second and third also fled. Then Agni we know hid inside water, but gods found him and took him out of water forcefully. Agni spitted on waters saying you could not provide me protection. From that three Aptya gods came out - Ekata, Dvita and Trita.
They started living with Indra."

First three Agnis represent the 75% of mass-energy in light space. Fourth Agni is the 25% of mass-energy in the observer space. Hiding of Agni in water represents the equivalence of matter and energy. Second part describes the formation of charged particles. Ekata means one**,** Dvita means two third and Trita means one third. These refer to particles carrying unit, two third and one third charge. Their description Aptya means electrically charged. Finally staying with Indra means these particles give rise to electrical force as they are electrically charged.

Quarks are six, and each quark has three variations making the total eighteen. These variations are given the name color by scientists, and quarks are said to have three colors. It is amazing that Vedic scientists also came up with the same idea of color to distinguish Gramya particles.

"Indra creates white milk in black and red cows."

Rgveda 1.62.9

"Two horses, black, red or white, draw the chariot of Agni."

Rgveda 2.10.2

In Svetasvatara Upanisad 4.5 Aja is said to be of three colors red, white and black creating various objects of its own form. In Maitrayani Samhita 4.5.7 Avi is said to be of three colors red, white and black. However, there are important differences between quarks and Gramya particles. Quarks are six and Gramya particles are only four. Also, all quarks are considered fundamental, while three Gramya particles Gau, Asva and Avi are said to be derived from Aja particle. This means that further simplification in the quark model will arise as scientists dig deeper into the properties of quarks. The Satapatha Brahmana clearly states that other particles are formed from Aja particle.

"Aja is the form of all animals." Satapatha Brahmana 6.5.1.4

Aja being the intermediate step in the transformation of energy into particles and particles into energy, this mantra makes perfect sense. Following mantras from the Vedas support this viewpoint.

"Aja is Agni." Atharvaveda 9.5.7

"Aja was born from perturbation (Soka) of Agni."

Atharvaveda 9.5.13

Aja was born from perturbation (Soka) of Agni and he saw Agni first and gods became gods due to Aja."

Yajurveda 13.51, Atharvaveda4.14.1

These mantras very well illustrate that Aja is more like energy than particle. Aja has been described as having only one foot (ekapada) in scriptures (Rgveda 7.35.13, Satapatha Brahmana 8.2.4.1). I have never encountered a goat having only one foot. This again is further proof of Aja being an intermediate step between transformation of energy into particle. Once the particle form has completely manifested, then this manifestation is referred to as an animal having four feet. In the Yajurveda following question is raised.

"What object is Pilippila and what object is Pisangila?"

Yajurveda 23.11

Pilippila is something that is very soft and presses very easily, Pisangil

"Avi is Pilippila and night is Pisangila?" Yajurveda 23.12

However, the inquirer is still curious and asks the question again to get a very definite answer. Then he receives the following answer.

"Aja is Pisangila, who like a dog gets things out and devours it again." Yajurveda 23.56

Here we find that Vedic scientists could not only observe the Gramya particles, but measure their properties as well. Avi particle is considered a soft particle because it has dense field-lines coming out of it. Total number of fundamental particles is considered eight in Jaiminiya Brahmana.

"There are eight Pasus."   Jaiminiya Brahmana 3.318

Obviously the sages could not be talking about animals, as they could easily count more than eight kind of animals around them. Eight animals refer to eight-fold division of fundamental particles known to particle physicists.

9.7: The Sacred Cow

The Rgveda is the celebration of the manifestation of universe. It describes the evolution of the cosmos as it has happened. The sages want the universe to form, because without universe you and I can not be there. They are happy when forces of expansion win the war over forces of contraction, because without expansion of the universe, there will be no universe. One of the fundamental particles that plays a very critical role in the expansion of the universe is Gau particle, and it is no wonder that cow became a sacred animal in Hinduism.

There are two complete hymns dedicated to Gau in the Rgveda (10.169 and 6.28). Two verses in hymn 6.28 are dedicated to Gau as well as Indra. Rgveda 10.19 is dedicated to Gau or Apah, and Rgveda 4.58 to Gau or Agni or Surya or Ghrta.

To a non-Hindu it is very difficult to understand why the cow is considered sacred by Hindus. Hindus do not eat beef, because they consider cow as mother, who nourishes us by her milk. This is the traditional justification. As most Hindu beliefs, the origin of this belief can also be traced back to the Vedas, which clearly have very high respect for cow. One of the adjectives for cow in Vedas is aghnya meaning not to be killed. One verse from the Rgveda says:

Cow is the mother of Rudras, daughter of Vasus, sister of Adityas, and should not be killed."   Rgveda g.101.15

That the cow should not be killed is repeated several times in . the Vedas. However, Vedic literature talks of cow-sacrifice along with horse, goat and sheep sacrifice. The sacrifice refers to Gramya particles not existing in their actual forms. As the chances of confusion of these particles with animals were extremely great, sages specifically referred to cow as aghnya. Sages took extreme precaution in dealing with the concept of Purusa and Gramya animals, as any wrong interpretation could have resulted in human or animal sacrifice. There are several verses in the Rgveda, where Gau can not be confused with cow animal. In post-vedic period ii as the real meaning of Gau was forgotten, additional meanings of word Gau were invented to make sense of the Vedic verses. Where Gau of sun is mentioned (Rgveda 7.36.1), Gau is interpreted to mean sun's rays. Where Gau is said to be mixed with Soma (Rgveda 9.10.3), Gau is interpreted as cow's milk. In all such descriptions, Gau means Gau particle, and its scientific meaning can be understood without taking recourse to secondary meanings of word Gau. Cows having one, two, four, eight or nine legs are mentioned in Rgveda 1.164.41. Cow has been called astakarni, having eight ears, in Rgveda 10.62.7. These verses are not describing ordinary cow animal, but they are describing Gau particle. Scientific meaning of these verses will become clear, when science reaches the capability of observing Gau particle in greater detail. Kausltaki Brahmana 12.1 says that "Apo vai " dhenavah" meaning waters are indeed cows. Why would anyone I write something like this? This is not the result of drinking too much Soma juice, rather it has a precise meaning. This is neither about water nor about cows, they are just symbols. Scientific meaning is that Gau particles are one form of matter particles, in Vedic cosmology Gau particle has a very special place. initially Universe is a complete void without space, matter and energy**.** The expansion of universe is not a smooth affair to begin with as the forces of expansion and contraction are delicately balanced**.** As the universe starts to expand, the creation of matter

and energy begins. This creation takes place at the surface of the universe. There is an energy barrier for this process to take place, and therefore the surface of the universe is given the name mountain by the Vedic sages. Gau particles, along with other particles, are produced at the surface of the universe. For this reason cows are said to be hiding in mountains in the Rgveda. According to Rgveda 10.67.4-5, Brhaspati opened three doors and freed cows. These three doors are the endpoints of the observer, intermediate and light spaces. As Gau particles are charged particles, remember that they have been identified with quarks having fractional charge, they produce electric force, Indra, and contribute to the expansion of universe. For this reason Indra is called to be protector of cows. Once the process has stabilized, the expansion of universe continues along with the creation of matter and energy. In the Vedas, sages are always asking for cows, horses and wealth. They are not asking for personal wealth, but they are asking for space, matter and energy in a universe without it, so that one day we human beings could exist. It is because of the role played by Gau particle in our existence that Cow is considered sacred. In ancient India wealth of a person was measured by the number of cows possessed by that person. This happened because the cow is described as wealth repeatedly in the Rgveda(1.33.1,5.52.17,5.57.7,5.79.7,6.44.12,7.67.9,7.77.5, 7.92.3,7.94.9). Atharvaveda 18.1.32 says that cow holds the earth. This verse describes the role of Gau particle in keeping the observer space separated from the light space. In the Puranas, earth sometimes takes the shape of a cow, which is a representation of verses like this from the Vedas. Rgveda 10.46.3 says that Trita found Agni on the head of cow, which means that Gau particle possesses one third fractional charge and that particle can be transformed into energy. Transformation of matter into energy and energy into matter is well accepted in Vedas, and this transformation is the subject of discussion in the next chapter.

'All particles of matter and energy are but different harmonies of strings.
- Sylvester James Gates

10. Matter and Energy

Vedic physics and modern physics both tell us that there is a continuous dance of creation and annihilation of particles everywhere in the universe. Behind the scene, matter particles transform into energy and energy transforms into particles. The Vedas describe this dance as follows. Energy changes into Aja, Aja into matter particles, particles into Aja, and Aja back into energy. This creation-annihilation energy has a very special place in the cosmology of the Rgveda, and the Vedic sages gave it the name of God Savita.

10.1: Savita

Savita is derived from root "su" meaning to procreate. Word "Prasava" from the same root means to give birth. As energy to matter particles, name Savita could not be more appropriate. Nirukta 10.31 says that Savita gives birth to all.

There are ten complete hymns dedicated to Savita (Rgveda 1.35,2.38,4.53,4.54,5.81, 5.82,6.71,7.38,7.45,10.149)'. There are twelve more mantras dedicated to Savita in other hymns (Rgveda 1.22.5-8, 1.24.3-4, 3.62.10-12, 10.139.1-3), and there are few more mantras in which he has been invoked together with other gods (Rgveda 1.24.5,1.35.1,7.38.6,9.67.25,9.67.26). God Savita is very special to the Vedic sages. They describe him in most beautiful words. The most sacred mantra of the Rgveda, Gayatri mantra, is dedicated to God Savita.

"Tatsaviturvarenyam bhargo devasya dhimahi, dhiyo yo nah prachodayat." Rgveda 3.62.10

meaning,

"Let's meditate on that brilliant radiance of God Savita. May he provide inspiration to our intellect."

To provide inspiration is the distinctive feature of Savita. Here is a beautiful hymn dedicated to God Savita.

Rgveda 1.35 Sage: Hiranyastupa Angirasa; Deity: Savita; Metre: 1,9: Jagati, Rest: Tristupa

1. I invoke Agni first for well-being, I invoke Mitra and Varuna for help, I invoke night (Ratri) giving rest to the world, I invoke god Savita for help.
2. Moving in dark atmosphere, placing immortals and mortals in their respective places, god Savita comes on a golden chariot observing the universe.
3. He goes by high-lying or low-lying ways, adorable travels by two bright horses. God Savita comes from faraway driving away all evil.

5. Covered with gold, having many shapes, bearing dark atmosphere, adorable Savita having beautiful brightness is riding on the chariot with golden axle.
6. His horses, which are dark in color but have white legs, carrying the chariot with golden front have seen the people well. Whole world and all people are always situated near god Savita.
7. There are three heavens, two of them are near Savita, in one Yama has his beautiful palace. As the chariot rests on the pin of the axle, immortals on Savita, one who knows this, come and tell us here.
8. The bird with beautiful wings has seen the atmospheres well. He is lifegiver, gives good guidance and deeply excited. Where is sun now, who knows? In which heaven its rays have spread?
9. He has seen the eight summits of earth, three joint regions and seven seas. God Savita having golden eyes has come giving precious gems to worshipper.
10. Savita having golden hands travels between both earth and heaven observing all. He removes diseases, instigates sun and pervades in heaven from dark atmosphere.
11. Having golden hands, lifegiver, giving good guidance, giving pleasure, self-supported Savita come here. Praised Savita takes his place every night driving away demons and evil spirits.
12. O Savita, the dustless roads, you had earlier, well-made in atmosphere, today protect us by those easy to travel roads, speak in our favor.

God Savita has golden chariot (verse 2), his chariot has golden axle (verse 4) and his chariot has golden front (verse 5). Savita has golden hands (verse 10) and golden eyes (verse 8). Savita also has golden tongue (Rgveda 6.71.3). Thus Savita and gold are very intimately connected. As gold is the color of energy in Vedic science, mere is an exact match between the description of God Savita and his identification with creation-annihilation energy. Scientists are well aware of the laws governing

transformation of energy. The Vedic sages are also well aware of these laws, when they say the following about the laws of Savita.

"Whose laws can not be violated by Indra, Varuna, Mitra, Aryama and Rudra, whose laws can not be broken by any enemy, I invoke that God Savita by praises for good fortune." Rgveda 2.38.9

In post-vedic times Savita became identical with Surya (sun). However, in the Rgveda, Savita and Surya are as distinct as they can be. Surya is not described as golden like Savita. Surya is time and again mentioned as residing in heaven, whereas Savita resides in atmosphere. In Rgveda 1.35.9 Savita is said to instigate Surya. Savita is said to join with rays of Surya in Rgveda 5.81.4. In Rgveda 1.123.3 Savita and Surya both are mentioned. Thus Savita is very distinct from Surya, and this distinction will become very clear when identification of Surya is taken up in a later chapter. For now, we will devote some time discussing another prominent Vedic God closely related with Savita, but forgotten in a later age, namely Pusa.

10.2: Pusa

There are eight complete hymns dedicated to Pusa in the Rgveda (1.42, 1.138, 6.53, 6.54, 6.55, 6.56, 6.58, 10.26). There are fourteen other mantras dedicated to Pusa (Rgveda 1.23.13-15, 3.62.7-9,6.48.16-19,10.17.3-6). In two hymns and four mantras Pusa has been invoked with other gods (Rgveda 2.40,6.57,8.4.15-18). Pusa means nourisher and is derived from root "Pus" meaning to nourish. Pusa is intimately connected with animals as seen from the following mantra:

"Animals are Pusa, nourishment is Pusa, nourishment is animals" Satapatha Brahmana 3.1.4.9

Pusa is called the guardian of animals (Pasupa) in Rgveda 6.58.2. Taittiriya Samhita 1.5.1.3 says that Pusa is the master of animals. As animals are particles, Pusa can be identified as "set of particles". All the particles are collectively termed Pusa. There are eight hymns dedicated to Pusa, because of the eightfold division of fundamental particles. The eightfold way of classifying fundamental particles was proposed by Murray Gell-Mann and Yuval Ne'eman in 1961[1]. The name "eightfold way" was suggested by association with the eightfold way of Buddhism. In

Rgveda 6.58.1 Pusa is said to have two forms, one black and other white. White form is that of particle and black form is that of anti-particle. Here is a beautiful hymn dedicated to Pusa.

Rgveda 6.54

Sage: Barhaspatya Bhardvaja; Deity Pusa, Metre: Gayatri

1. O Pusa, take us to the wise person, who shows us straight path, who tells emphatically that this is (our lost wealth).
2. Let's join with Pusa, who shows the way to our homes, who says that this is.
3. The wheel of Pusa never gets damaged, seat on his chariot never falls, felly of his wheel never wavers.
4. Pusa never forgets him, who pays oblation to Pusa. He receives wealth first.
5. Let Pusa walk behind our cows, let Pusa protect our horses, let Pusa give us grains.
6. O Pusa, walk behind the cows of us praisers and sacrificers, who are extracting juice of Soma.
7. Let none of them get lost, let none of them get hurt, let none of them fall in pits. Come to us with unhurt cows.
8. We ask for wealth from Lord Pusa, who hears our praises, who is careful and whose wealth is never lost.
9. O Pusa, let's abide by your laws, and never get hurt, we sing

10. Let Pusa hold his right hand very far away, and bring back our lost animals.

In verse three wheel of Pusa is mentioned, which represents the spin of the particles. Pusa is the master of great riches in Rgveda 6.55.2. This makes perfect sense as particles are the wealth of the universe. Relationship of Pusa with Savita is described by the following verses in the Vedas:

"Savita instigates Pusa for movement." Rgveda 10.139.1

"Pusa moves by inspiration of Savita." Yajurveda 17.58

"Savita becomes Pusa by his movement." Rgveda 5.81.5

These verses establish that when energy (Savita) transforms into particles, it is called Pusa. Pusa is called Ajasva in Rgveda 1.138.4, 6.55.3 and 6.58.2. Ajasva is made by joining of words Aja meaning goat and Asva meaning horse. Ajasva means one whose goats do the work of horses. Following verses do not leave any doubt about the work goats do for Pusa.

"The chariot of Pusa is drawn by Aja."

Rgveda 6.55.6,6.57.3,10.26.8

The reader should recall that Aja has been earlier described as the intermediate stage between the transformation of energy into matter particles. For this reason Aja is said to drive the chariot of Pusa.

The process of creation and annihilation of particles can now be described as following:

Savita -» Aja -» Pusa -» Aja -» Savita

In Brahmanas, like many other gods Pusa also became one of the names of sun. However, description of Pusa in the Rgveda, can not be that of sun by any stretch of imagination. In Rgveda . 6.56.3 Pusa is described as rotating the golden wheel of sun. In Rgveda 6.58.3 Pusa is said to be the messenger of sun. Importance of Pusa gradually decreased after the Vedic age and in the Puranas he hardly gets any mention. His main job as the keeper of animals was assigned to Siva, and as Siva is currently worshipped by Hindus all over the world, historians were quick to identify the seal of Pusa as that of Siva, Lord of the animals.

10.3: Lord of the Animals

Figure 10.1 shows Pusa, Lord of the animals. This figure is widely recognized as that of representing an earlier form of Siva, and has been given the name Proto-Siva. This identification is jjjj completely wrong. The figure has no resemblance to that of Siva. There is no Trisula, the weapon of Siva, there is no Nandi Bull, who accompanies Siva, there is no moon on the forehead, there is no Ganga river flowing from his lock of hair. Only reason this figure has been identified with Siva, is that Siva is called Lord of the animals, and there are several animal figures surrounding the central figure. However, this can not be considered a clinching evidence, because there is a god in the Rgveda, Pusa, who is explicitly referred to as Lord of the animals. Siva is not even K mentioned in the Rgveda, because Siva is a later concept that has formed by the amalgamation of the Rgvedic gods Pusa and Rudra. My contention is that from the Rgveda to the Brahmanas to the Puranas we have a complete description of the evolution of Hinduism and history of India, and there is absolutely no need to f take recourse to vague prefixes like "Proto". Our ancestors believed in learning, they have kept records assiduously, and they have left us enough material to construct our history right from



Figure 10.1: Pusa, Lord of the animals, a seal from Mohenjo-daro (M-304)

the Indus Valley Civilization to the present day. All we need to do is to use logical reasoning without bias, be objective, and separate science from mythology and mythology from history. Proto-Siva, Proto-Sanskrit, Proto-Indo-European language, all these are purely speculative concepts. Sanskrit is the mother of all languages in Indo-European family, and there was never any language called Proto-Sanskrit.

We have already seen that there was a complete ban on the depiction of horse, cow, sheep and goat, and therefore these animals are not shown in the figure. There is an animal figure below the central figure, which looks like a deer. In the Rgveda goat is repeatedly said to be the vehicle of Pusa, and if depiction of goat was banned, deer could be considered a natural replacement. Central figure wears a headgear in the seal, and Pusa is described as wearing headgear in Rgveda 6.55.2. As the Rgveda forms the basis of understanding the Indus Valley Civilization, it is only logical to identify the central figure with that of Pusa.

Savita and Pusa represent energy and matter particles in the Rgveda. You might be wondering what are the Vedic counterparts of electron, proton and neutron, the building blocks of atoms. Is there a similar triad in Vedas? It is time to find out.

"If Christianity was somehow stopped at its birth, whole world would be following Mithraism today."
- Ernest Renan

11. Electron, Proton and Neutron

History of India as known today has been written by foreigners. Native history of India is completely opposite to the history of India compiled by foreigners. Foreigners were not interested in writing an objective history of India, because they were serving their ideological masters. Foreigners were not satisfied by merely dividing Indians using pseudo-history, but they divided our gods also on racial lines. Hindus have never discriminated against people based on their color. Hindus worship God Krsna and Goddess Kali. Both, Krsna and Kali, mean black and are depicted as such as well. Foreigners have created a mess by dividing Gods along Aryan and Dravidian lines. All this is pure rubbish, as India was never invaded by Aryans. One of the gods in the Vedic pantheon supposed to have been borrowed from Dravidians in the Indus Valley is god Varuna.

11.1: Varuna

Varuna is made from root "Vr" and means one who covers. Nirukta 10.4 says that Varuna is called so because he covers. Gopatha Brahmana 1.7 also provides similar derivation. We have already met two other words with same etymological meaning, Vrtra and Varaha. Vrtra and Varaha cover the universe, what could Varuna possibly cover? To find the answer, we have to delve deep in the Vedic concept of Varuna. Let's start by going through a beautiful hymn dedicated to Varuna in the Rgveda.

Rgveda 5.85 Sage: Bhaumatri; Deity: Varuna;
Metre: Tristupa

1. Praise supreme ruler Varuna by great, deep and endearing prayer. He expanded earth for sun like a hunter kills for skin.
2. Varuna expanded atmosphere in forests. He strengthened the horses, put milk in cows, gave desire to work in hearts, established Agni in waters and sun in heaven. He created Soma on mountains.
3. Varuna turned the mouth of big barrel of water downwards for earth, atmosphere and heaven and freed it. From that, the king of whole universe makes the soil fertile like rains nourish the grains.
4. Varuna waters earth and heaven when he wants to create the rain of milk. Mountains are covered by clouds and strong warriors slacken them.
5. I praise this great feat of famous supreme spirit Varuna. He measured earth by sun using a standard staying in atmosphere.
6. Nobody could destroy this great achievement of the knowledgeable god. Due to this, flowing rivers can not fill even one ocean by their waters.
7. O Varuna, If we have sinned towards Aryama, Mitra or Varuna, friends or those always behaving like brothers, those always near or afar, free us from that.

8. If we have lied like gamblers or we have actually committed sin without knowing it, O Varuna, free us from sins like loosening the bond, so that we can be dear to you.

Verses three and four associate Varuna with waters. Rgveda 7.49.3-4 and Yajurveda 19.94 say that Varuna is the king of waters. We have already seen that the water of the Vedas is matter and anti-matter. Most matter and anti-matter particles are electrically charged. Among the electrically charged particles electron is the most important particle. The position of electron among fundamental particles is worthy of calling electron the king of particles. Thus Varuna can be identified with electron. Now, we should keep in mind that sages chose every word very carefully to declare its own meaning. Varuna means one who covers and does that apply to an electron? In fact, it does. Electron covers an atom, so that scientists refer to it as electron cloud. Now we should see how this identification fits in the framework of the Vedas.

In verse eight sages ask Varuna to loosen the bond and free them from sins. The net of Varuna is mentioned several times in the Rgveda (1.24.13,1.24.15,1.25.21,7.88.7). In Rgveda 6.74.4 sage asks to be freed from the net of Varuna. What is this net made of?

"Varuna's net is not made of ropes, but people are caught by it."

Rgveda 7.84.2

Varuna captures sinners in his net and punishes them. This power of Vauna is also referred as Maya of Varuna in Rgveda (5.85.6, 8.41.3, 8.41.8). This net of Varuna is the electric field surrounding an electron and Maya of Varuna is the attractive electric force. Varuna is also famous for the spies he employs for overseeing everyone in the universe.

"Nobody can deceive the spies of Varuna."   Rgveda 6.67.5

"Varuna's spies see everything by their thousand eyes."
Atharvaveda 4.16.4

Who are the spies of Varuna? Modern scientists have found out who they are. Modern scientists treat electron as an octopus, which continuously sends its probing arms at an unimaginable rate to feel out its neighborhood[l]. These spies are the virtual particles through which electron knows what is in its neighborhood. Thus the identification of Varuna with electron fits very well in the framework of the Vedas. Further support comes from the following description of Varuna.

"Mitra is day and Varuna is night." Taittiriya Samhita 2.1.7

This description shows Mitra and Varuna to have opposite nature. Varuna is called night, and by this his dark or black color is stressed. In Vedas black is the color of negative electric charge, and electron also carries negative electric charge. Also, Satapatha Brahmana 5.2.5.17 says that everything that is black belongs to Varuna. Varuna is described as firm on following the laws in Rgveda 1.25.8. Electron is also very finicky about maintaining the laws. It is because of maintaining an orderly universe that Varuna was elevated to the position of supreme deity by Iranians.

11.2: Ahuramazda

Ahuramazda is the supreme deity in Avesta. Ahura is same as Asura of Sanskrit as Iranians invariably pronounced Sanskrit V as "h". In later Indian scriptures Asuras formed the forces of evil and Devas the forces of good. However, in the Rgveda Asura is not used in a derogatory sense. In the Rgveda Varuna is often called by the adjective Asura (1.24.14, 2.28.7, 8.42.1). The character of Varuna and Ahuramazda is strikingly similar.

Moreover, in the Rgveda Mitra and Varuna are worshipped as a pair "Mitravarunau" and in the Avesta, Mitra and Ahura are worshipped as a pair "Mithrahura", and again the character of these two pairs are strikingly similar. Therefore it can be safely said that Ahuramazda of ancient Iranians is none other than Varuna. When Iranians forgot the real meaning of the Vedas, they needed to reorganize their religion. As a civilized people trying to maintain an orderly society, they raised Varuna to the pedestal of supreme deity, as Varuna stood for self-righteousness and order, Devas associated with the warlike qualities were made into the forces of evil.

The Avesta describes Ahura in the following way. Ahura is the ruler of entire world (Yasna 31.1). Ahura is the best and most powerful king, whose orders can not be violated by anyone (Yasna 27.1 and 31.2). Ahura has fixed the place of sun, moon, earth, seas and rivers. He has fixed and controls the path of sun and stars (Yasna 37.1 and 44.1). He has created day and night (Yasna 44.5). He is awake day and night and sees the good and bad deeds of people (Yasna 31.13 and Vendidad 19.20). Nobody can deceive him, he is wise and great (Yasna 43.6 and 45.4). Mazda means wise. Similar description of Varuna is found in the Rgveda. Vamna is wise (Rgveda 1.124.14). Varuna is called king in Rgveda 1.24.7. Varuna has widened the path of sun (Rgveda 1.24.8). He has divided day and night and seasons (7.66.11). Varuna is the source of Rta (Rgveda 2.28.5) and so is Ahura source of Asa (Yasna 10.4). Thus the equivalence of Vamna and Ahuramazda is proven beyond doubt. Now let's try to find out the identity of the famous companion of Varuna, that is Mitra.

11.3: Mitra

There is only one hymn dedicated to Mitra in Rgveda. In twenty four other hymns Mitra is worshipped together with Varuna. As

Varuna has been identified as electron, it immediately follows that Mitra be identified as proton. Mitra means friend, and protons do sit together like friends inside the nucleus of an atom. Depiction of Mitra as day in Taittiriya Samhita 2.1.7 also supports this identification. Day stands for brightness and white color, which was chosen by Vedic sages to represent positive electric charge. Proton carries unit positive charge, and it is for this reason that there is only one hymn dedicated to Mitra.

Rgveda 3.59

Sage: Visvamitra; Deity: Mitra; Metre: Tristupa, 6-9 - Gayatri

1. Mitra orders people to do their work. Mitra upholds earth and heaven. Mitra oversees the people without winking. Make the oblation containing butter for Mitra.
2. O Mitra, son of Aditi, that mortal becomes happy, who follows your laws. (He) is neither killed nor won, who is protected by you. Sin does not enter him either from near or from afar.
3. Without disease, happy, walking among the best place of earth, firm-kneed, following Aditya's laws, we want to stay under the great intellect of Mitra.
4. This venerable, serveable, intelligent king Mitra has been born. We want to live according to the auspicious intellect of that adorable (Mitra).
5. One should bow to go near great Aditya. Instigating men to do their work, (Mitra) provides happiness. For that venerable Mitra offer this oblation in Agni.
6. Favor of God Mitra, bearer of cultivators is laden with spoils. His splendor has most wonderful fame.

7. This famous Mitra pervades heaven by his greatness and earth by sounds.
8. Five men offer oblation for Mitra, one who renders powerful assistance. He holds all the gods.
9. Mitra fulfills the desires of those following the laws among

the gods and mortals for people who gather and spread the sacrificial grass.

Mitra became Mithra in Iran and later Mihira meaning sun.
Vedic god Mitra was once worshipped as Mithra all over Europe.

11.4: Rise and Fall of Mithraism

In first century C.E. Mithraism started to gain popularity in Roman empire. It spread with extreme rapidity and by third century C.E. it has reached the height of popularity. The greatest number of Mithraea are found in Germany. Mithraea have been found all i over Europe including Italy, Switzerland, Britain, France and Spain. For more than three centuries Mithraism was practiced all over Roman empire. Scholars have tried to explain the symbolism behind Mithraism without taking the Rgveda into account. Many scholars hold the view that the concept of Mitra was borrowed by Indians from Iran, because Mitra is not a prominent god in the Rgveda. He has been dedicated only one hymn. This kind of reasoning can not apply to the Rgveda. The Rgveda has only one hymn dedicated to the Purusa, but there is no doubt that the Purusa hymn is the most important hymn of the Rgveda according to Indian tradition. There is only one hymn for Mitra, because proton has a unit positive charge. Also, there are twenty four complete hymns in which Mitra is invoked together with Varuna, so Mitra is not a neglected god in the Rgveda. It was Iranians who borrowed the concept of Mitra from India.The Rgveda is a complete book of cosmology, and therefore parts of it can not be borrowed from elsewhere. Others borrowed the Rgvedic ideas without even knowing what they stood for. The Vedic ideas were spread in Iran after the Mahabharata war when the Indus Valley Civilization declined.

Let's try to understand Mithraic symbolism in the light of Vedic wisdom. Mithraea, temples of Mithra, were designed to look like caves, which symbolized the universe. A cave is surrounded by stones and the Rgveda depicts the universe to be surrounded by mountains as we have seen earlier. Gods did not exist before the creation of the universe according to the Rgveda. Thus gods came into existence by breaking up the mountains covering the universe. This is the secret of the rock birth of Mithra. David Ulansey illustrates the birth of Mithra in his book "The Origins of the Mithraic Mysteries" [2]. Mithra was depicted as coming out of an egg shaped rock which is entwined by a serpent. Universe was considered egg shaped by the Vedic sages, and this idea was spread all over the globe. Earlier I described Vrtra the serpent as the cover of the universe based on logical reasoning and scriptural support. Now we have found a rock solid proof of my reasoning that Vrtra covered the whole universe. Proponents of the Aryan Invasion Theory have accused Indra of breaking the dams of Dravidian people by identifying Vrtra the serpent as a dam holding water. Here is positive proof that they are clueless about the meaning of the Vedas. The most prominent feature of Mithraic iconography is the slaying of bull by Mithra. When Mithra slays the Bull, instead of blood all kinds of herbs and plants sprang from the victim. This reminds us of the sacrifice of the Purusa by gods. Birth of Mithra from rock is similar to the birth of Vedic god Indra. Indra later became a sun god and subordinate to supreme god Visnu. Mithra was also a sun god whose birthday was celebrated on 25th December.

In Mithraic theology, Mithra was not the supreme god, but sub-ordinate to Leontocephalous Kronos, the lion headed time god. The illustrations of Leontocephalous Kronos can be seen in David Ulansey's book "The Origins of the Mithraic Mysteries"[3]. The lion-headed god is shown as having a pair of wings and his body is entwined six times by a serpent. The head of the serpent rests on the skull of the god. So far researchers have not given

any thought to the Indian origin of Mithraism, rather all attempts have been made to find its origin in Iran. India was the land from which copious myths spread in all directions, and it is highly probable that Mithraism was developed by a group of Indians who had access to the secret science of the Vedas, now largely forgotten.

Lion headed god of Mithraism seems to be a modified form of Nrsimha incarnation of Lord Visnu. Visnu incarnates as a lion headed god to kill demon Hiranyakasipu. He rests on the coils of serpent Sesanaga who provides shade to him by spreading his head above. Vehicle of Lord Visnu is eagle Garuda. In Mithraism serpent Sesanaga envelops lion headed god and wings of Garuda become transplanted on the god himself. Moreover, the Satapatha Brahmana says that "Kalo vai Visnu" meaning Visnu is time indeed. Thus it stands to reason that the lion headed god of Mithraism is only a modified form of Lord Visnu in his Nrsimha incarnation. The spread of Mithraism was the result of the third wave of emigration of ideas from India. First wave spread the knowledge of the Vedas in Iran, second wave spread the knowledge of the Brahmanas in Greece and the third wave spread the knowledge of the Puranas in Roman empire.

The decline of Mithraism started with the rise of Christianity. During their struggle for supremacy, Christianity absorbed many elements of Mithraism. Arnold Toynbee has called Mithraism the "Crucible of Christianity". Franz Cumont in his classic work "The Mysteries of Mithra" draws our attention to the similarities between Mithraism and Christianity[4]. Both performed baptism for purification. Both considered Sunday sacred. Both celebrated 25^{th} of December, Mithras as birthday of Mithra and Christians as birthday of Christ. Both believed in Heaven and Hell and a flood at the beginning. Both believed in a last judgment and resurrection of the dead.

Some of the elements that Christianity borrowed from Mitraism are considered blasphemous by orthodox Christians.

In an article titled "Let's Keep Christ Out of Xmas" maintained on Internet, Pastor Greg Wilson of Landmark Independent Baptist Church says that Christmas has nothing to do with Jesus Christ. He further states that he has no desire to honor baby Mithras on his December 25th birthday and urges all Christians to keep Christ out of the pagan Xmas mess[5].

Once Christianity became strong enough, it exterminated Mithraism by force. Titus Marcus II, Mithrasic High Priest wrote in a letter in 325 C.E. that most Mithraea have been looted and burnt and Mithras are meeting in private homes[6]. Patriarch George provoked a bloody riot in December 361 C.E., when he attempted to erect a church on the ruins of a Mithraeum. Many Mithras were falsely implicated in a conspiracy and put to death in 371 C.E. Mithraea were sacked and burned with the complicity of the authorities. Cumont describes the persecution of Mithras saying Christianity demanded the total destruction of idolatory, and its exhortations were promptly carried into effect[7].

By the end of the fourth century C.E. Mithraism was finished by Christianity. Its fall was as swift as its rise. But Mithraism did not die after all, it lied dormant somewhere in the collective memory of Europeans. In eighteenth century these ideas took a concrete shape and Mithraism got a new birth in the form of Freemasonry.

11.5: Aryama

There is no separate hymn for Aryama in the Rgveda, and his name is often invoked together with Mitra and Varuna. After identifying Mitra with proton and Varuna with electron, it is natural to identify Aryama with neutron. In the Vedas Varuna, Mitra and Aryama form a triad similar to that of electron, proton and neutron. They are often invoked together. Now we can understand why there is no hymn addressed to Aryama. When

sages say mat their praises are reaching the deities, what is meant is the propagation of field. Neutron being charge neutral does not get affected by electric field, so there is no hymn devoted to him. Aryama means friend, and neutrons also sit together like friends inside the atomic nucleus. In Iran Aryama became Airyaman and kept same meaning. He was invoked during marriage ceremony in India and Iran. Here is a hymn in which Aryama is invoked together with Mitra and Varuna.

Rgveda 1.41
Sage: Kanva Ghaura; Deity: Varuna, Mitra and Aryama, 4-6 - Adityas; Metre: Gayatri

1. Who is protected by wise Varuna, Mitra and Aryama, that person can not be suppressed.
2. Who is nourished by them, that mortal is protected from harm. He is safe from all sides.
3. These kings destroy the towns and citadels of hostile people. They take us beyond sins.
4. O Adityas! The roads of truth are easy to travel and without thorns. There is no destroyer here.
5. O leader Adityas! The Yajna that you perform on roads of truth, how can that be destroyed by your meditation?
6. That mortal obtains gems, all wealth and children as well easily without being harmed.
7. O friends, how are we going to write the hymns worthy of describing the greatness of Mitra, Aryama and Varuna.
8. Who kills those aspiring to be gods or who curses them, let him not talk to me. Let us satisfy you by devotion.
9. Who holds the four objects, let people fear from his opponents. Let us not desire to talk in dirty language.

By now it will he clear that the Rgveda is a book of physics. There are many concepts in the Vedas, which we can identify by

their equivalents in modern physics. It is also to be noted that the Rgveda and modern physics differ on many vital points, and therefore many Vedic terms have no equivalents in modern physics, for example Vrtra, Antariksa and Dyau. It is up to the physicists to probe deeper in the nature of reality and find out whether the Vedas are wrong or modern physics needs to be modified. If someone discovered the ultimate laws of physics five thousand years ago, coded those laws in the form of a sacred book, and made sure that not a single letter of that book would be altered in any way, then it is the duty of scientists to investigate this matter very seriously. We have seen that the Vedic sages knew about electric force and electron, now we will see that they knew about electric charge, electricity and magnetic field as well.

"Nothing is too wonderful to be true." -
Michael Faraday

I I I

12. Electricity and Magnetism

In Chapter five Indra was identified as electric force. If Vedic sages knew the existence of electric force, they must have had precise knowledge of related scientific phenomena. You are about to find out that the phenomena of electricity and magnetism have been described in detail in the Vedas. We will start by taking up the discussion of Soma, the drink of the gods.

12.1: Soma

The Rgveda is emphatic in saying that real meaning of Soma is very different from the apparent meaning of a herbal plant, whose juice is supposed to be very intoxicating.

"When herb is crushed, people think they have drunk Soma. The Soma mat wise people know, nobody can eat that."

Rgveda 10.85.3

Soma has a very important place in the Rgveda. The ninth book of the Rgveda consisting of 114 hymns is solely dedicated to purifying Soma. Gods are invoked to drink the juice of Soma. Indra is often described in the Vedas as drinking juice of Soma. The effect of drinking Soma is quite intoxicating on Indra. He performs great deeds under the influence of Soma. If Indra is electric force, Soma can be identified as electric charge. Electric force depends on the magnitude of electric charge, greater the charge, larger the force. According to Rgveda 10.42.4 Indra does not befriend those who do not offer Soma. This is so because electric force can act between electrically charged particles only. Electric force cannot act on an uncharged particle. The relationship of Soma with fundamental particles is described in the Vedas. Following question is asked in the Vedas:

"What is the semen of strong horse?"

Rgveda 1.164.34, Yajurveda 23.61

Answer is provided in the next verse.

"Soma is the semen of strong horse."

Rgveda 1.164.35, Yajurveda 23.62

It is noteworthy that Soma as a plant can not be related to the semen of horse as an animal. The Vedas are full of such descriptions, which make no sense at all unless we realize what the Vedas are about. Here Soma is electric charge and horse is Asva particle. These verses are saying that electric charge is distributed all over Asva particle. In Rgveda 1.28.9 and 9.65.25 Soma is said to be kept on cow's skin, in Rgveda 9.66.29 Soma is said to play on the skin of cow. This means that electric charge is distributed over the surface of Gau particle. The Vedas make a difference about whether charge is distributed all over the particle or only on the surface. In modern physics such questions do not

arise because fundamental particles are considered point particles. Another recurring theme in the Rgveda is that of purification of Soma by passage through hair of sheep (9.6.1,9.20.1). This refers to passage of electric charge through field lines of Avi particle, but meaning of purification is not clear to me.

Soma lives on mountain (Rgveda 9.82.3). The name of this mountain is Munjavana. There is no mountain to be identified by this name. In the Vedas surface of the universe is called mountain. Matter and energy is created at the surface of the universe. As most of the matter particles are electrically charged, electric charge is also created at the surface. It is in this sense that Soma is said to live on mountain. Outside of the universe is considered ten-dimensional in Vedas. In Rgveda 9.6.5 and 9.8.4, it is said that ten fingers take care of Soma. Ten women call Soma in Rgveda 9.56.3. The ten dimensions are represented as ten fingers or ten women and these verses represent creation at the surface of the universe.

12.2: Indu

In the Rgveda there are two related terms "Soma" and "Indu", both have come to mean moon in later literature. Another word for moon "Candrama" also occurs in the Rgveda, which is again used in a technical sense, because Candrama is said to reside in waters. In the Rgveda, word Soma is used for the herbal plant and word Indu is used for its juice. Having identified Indra with electric force and Soma with electric charge, Indu can be identified with electricity. Electricity is the flow of electric charge, and when juice of Soma flows it is called Indu. Here is a beautiful hymn dedicated to Indu.

Rgveda 9.2

Sage: Medhatithi Kanva; Deity: Pavamana Soma;
Metre: Gayatri

1. Soma is very gratifying to the gods, pure and pleasing. Indu, enter in mighty Indra.
2. Indu possesses great strength and splendor. Give us those qualities. Upholder sit in Yajna.
3. The pious stream of Soma juice provides lovely honey. Performer of good deeds lives with water.
4. Great rivers carrying water come to you, mighty, when you are mixed with cows.
5. Who holds and keeps heaven and ocean apart, is mixed in water. Purified Soma comes to us.
6. Worthy of perception like great Mitra, strong Hari makes sound. He brightens by sun.
7. Indu, your praises purify, activate and provide strength, by which you brighten for happiness.
8. We ask you to encourage us. You inspire the world to work. Your glories are great.
9. Indu, you take us to Indra. Purify us by sweet streams, like rain producing clouds.
10. Indu, you provide cows, men, horses and food. You are the first soul of Yajna.

Verses three to five relate Soma to water. Water represents matter and anti-matter, and their association with Soma means that matter and antimatter are electrically charged. First half of verse three is the most important clue to another scientific phenomena. It tells us that honey is provided by the stream of Soma juice. Word for honey in Sanskrit is Madhu and the Vedic literature is full of allusions to a hidden knowledge called Main* Vidya, knowledge of Madhu. This is the right time to discover the secret of Madhu Vidya.

12.3: Madhu

It is well understood in Physics that phenomena of electricity, and magnetism are interrelated. A moving electric charge gives rise to magnetic field. Stream of Soma juice is the movement of electric charge, and if it provides Madhu, then Madhu must be magnetic field. Now Madhu or honey tastes sweet, and it is for this reason that Madhu also means sweet. In the Vedas almost to everything in the universe is described as sweet or full of honey.

Consider the following verses:

"Truthful air is sweet, rivers are flowing with honey. Herbs are pppfull of honey for us." Rgveda 1.90.6

"Night and dawn are sweet, dust of earth is soaked with honey. Father heaven be sweet for us. Rgveda 1.90.7

"Vegetation be soaked with honey for us, sun be soaked with honey. Cows be full of honey for us. Rgveda 1.90.8

One verse from Upanisad says:

"This earth is honey for all beings, and all beings are honey for earth." Brhadaranyaka Upanisad 2.5.1

These verses are telling us that magnetic field pervades almost everything in the universe. In Rgveda 2.10.6 Agni is called full of honey. This signifies that magnetic field carries energy. Rgveda 7.47.2 says that waves of water are full of honey and Rgveda 10.30,13 describes waters as carrying honey. These verses describe the magnetic field generated by the movement of electrically chained particles. In Rgveda 1.90.8 sage prays for the their cows to become Ml of sweetness. This verse describes the magnetic field around Gau particle.

Brhaddevata 3.19-22 tells the following story about the secret knowledge of Madhu:

"Sage Dadhichi knew the knowledge of Madhu. Indra told the sage not to mention the knowledge of honey to anyone, otherwise he will kill the sage. Asvins asked the sage for knowledge of honey and the sage expressed his inability quoting Indra's threat. Asvins implored the sage to give the knowledge while having the shape of a horse-headed man. Upon his nod, Asvins cut the head of the sage and joined the head of a horse to the body of sage and received the knowledge of Madhu. When Indra came to know of this, he severed the head of horse from the sage. Asvins joined the original head of the sage and revived him."

This story is based on Rgveda 1.116.12 and 10.48.2. These verses point towards an intimate connection between Madhu and Asvins. It is time to investigate this connection and unravel the secret of Asvins.

12.4: Asvins

Asvins are twin gods in the Vedas. They are always mentioned as a pair. One of them is called Nasatya and other is called Dasra. Asvins are considered physicians of the gods. In Greek mythology they are called Dioskauroi. In the Avesta they are called Naomhaithya (Nasatya) and are considered demons.

We have two important clues to figure out the secret of Asvins. One, they are related to magnetic field and two, they are twins. Does something very familiar ring a bell? Of course, the magnetic poles. Asvins are magnetic poles. Magnetic poles are always found as a pair. They can never be isolated. Let's see if our identification of Asvins with the magnetic poles finds further support in the Vedas.

Asvins are called Madhuvarna, having color of honey, in Rgveda 8.26.6. In Rgveda 5.75 Asvins are called Madhvi, full of sweetness, in all nine verses. They are called Madhuyu, filled with honey, in Rgveda 5.73.8 and 5.74.9. In Rgveda 1.180.2 they are called Madhupa and in Rgveda 8.22.17 Madhupatama, both words meaning drinkers of honey. According to Rgveda 1.112.21 and 10.40.6, Asvins provide honey to honeybees. His chariot is called Madhuvarna, having color of honey, in Rgveda 5.77.3. His chariot is also called Madhuvahana, vehicle for carrying honey, in Rgveda 1.34.2, 1.157.3 and 10.41.2. They have a madhumati kasa, a whip soaked in honey, according to Rgveda 1.22.3 and 1.157.4. Obviously these descriptions describe a very intimate connection between Madhu and Asvins. Anthropomorphic description of gods is the style of the Rgveda to convey abstruse scientific knowledge in a dramatic way. Here the connection between the magnetic field and the magnetic poles $_{f}$is so strong that Asvins have been described as drinking honey, carrying honey, even having the color of honey. You will recall that a similar description of god Savita is found in the Rgveda. Savita has golden hands, golden eyes and golden tongue. He has a golden chariot. His chariot has golden axle and golden front. Energy is described as golden in the Vedas, and therefore god Savita has been described as having everything golden. Once we know the scientific meaning of the Vedas, then we realize that these descriptions are not arbitrary, but there is a remarkable precision in these representations.

There are forty two complete hymns dedicated to two Asvins in the Rgveda (1.34,1.46-47,1.112,1.116-120,1.157-158,1.180-184,2.39,3.58,4.43-45, 5.73-78, 6.62-63, 7.67-74, 8.22, 10.39-41, 10.106, 10.143). Now is the perfect time to ponder over the scientific meaning of a mysterious hymn dedicated to twin gods Asvins.

Rgveda 1.34 Sage: Hiranyastupa Angirasa; Deity: Asvins; Metre: Jagati, 9,12 - Tristupa

1. O learned, today be ours three times. O Asvins, your chariot and gift are all-pervading. Like (warm) clothes are intimately connected with winter, you two come very near to wise people.
2. Chariot carrying honey has three tires. Your longing for Soma is well known. Three pillars are fixed on your chariot to give support. O Asvins, you travel three times in night and three times a day.
3. O concealer of imperfection, today mix Yajna with honey three times in the same day. O two Asvins, give us strengthening food three times fully during morning and evening.
4. Come to our home three times. Go to your followers three times. Teach the three kinds of knowledge three times to good people. O two Asvins, carry the pleasure providing materials three times and nourish us with permanent food three times.
5. O two Asvins, carry the wealth three times, come to Yajna three times and protect our intellect three times. Give wealth three times and grains three times. Daughter of sun is now riding on your chariot with three wheels.

6. O Asvins, give us the herbs from heaven three times, from earth three times and from waters three times. O lord of good fortune, for the protection and happiness of our children provide the threefold shelter.
7. O adorable Asvins, sit down on our altar of threefold earth everyday three times. O charioteer Asvins, come to our homes three times even from faraway places like the life giving air.
8. O Asvins, three containers have been filled three times by the seven mother rivers. Oblation is also divided in three. You protect three earths and the vault of heaven above day and night.
9. O Nasatya, where are the three wheels of the chariot with three enclosures? Where are the three connections in the same

place. When will the strong donkeys be yoked in your chariot riding which you come to the Yajna.
10. O Nasatya, come here, where oblation is being offered. Drink sweet drinks by your mouths used to drinking honey. Savita instigates your beautiful chariot smeared with clarified butter even
before dawn for Yajna.
11.0 Nasatya Asvins, come here to drink honey with three times eleven gods. Make our lives prolonged, purify us by removing our weaknesses, remove jealousy and always stay with us
12.0 Asvins, bring to us good warriors and wealth by your chariot of three enclosures. I call you hearers for our protection. May we expand in battles.

A special connection is made between Asvins and number| three in these verses. Three containers in verse eight are three spaces, earth, atmosphere and heaven. Meaning of invoking Asvins to come three times everyday will become clear later, when I discuss Vedic cosmology. For now we will focus our, attention to another phenomenon deeply connected with electricity and magnetism, that of light.

"I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the seashore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me."

- Isaac Newton

13. Let There be Light

When we think of light, our attention is immediately turned towards the sun, or "Surya" in Sanskrit. Surya has a unique identity in the Rgveda, and can not be confused with other deities, who have merged their identity in the sun of the post-vedic literature. As the Rgveda is a coded book, actual meaning of Surya is not sun in the Rgveda. Five complete hymns have been dedicated to Surya in the Rgveda (1.50, 1.115, 10.37, 10.158, 10.170). There are eighteen other mantras dedicated to Surya in hymns dedicated to other gods (Rgveda 1.164.46-47, 4.40.5, 5.40.5,7.60.1,7.62.1-3,7.63.1-5,7.66.14-16,8.101.11-12). Surya is time and again related to eyes in the Vedas.

"From his mind moon was born, from his eyes Surya was born.

Rgveda 10.90.13

"O Surya, give our eyes the power to see." Rgveda 10.158.4

"Surya is the Lord of eyes." Atharvaveda 5.24.9

Even in the Brahmanas identification of Surya with eyes continues, however at some places Surya starts to be substituted by other deities who have merged their identity in Surya.

"Surya is situated in my eyes." Taittiriya Brahmana 3.10.8.7

"Which is your eye, that is Aditya." Satapatha Brahmana 10.3.3.7

The eyes are related to light, and that is exactly what the Vedas mean, when they talk about Surya. Considering that the Rgveda is a book of cosmology, it can not mean sun by Surya, because sun has no special place in the cosmos. Sun is one out of billions of stars in the universe, and the Rgveda in order to be consistent must deal with more fundamental properties of the universe. There are ample evidences to prove that Surya does not mean sun in the Rgveda. The Rgveda talks about several Suryas in verses 9.114.3 and 10.88.18, while there can be hardly any doubt that sun is only one.

Surya has been called "Urucaksa" in Rgveda 7.35.8 and "Duredrsa" in Rgveda 10.37.1, both meaning seeing very far. Surya is also called "Visvacaksa" meaning seeing all in Rgveda 1.50.2. These descriptions fit very well with the identification of Surya with light.

Rgveda 1.115 Sage: Kutsa Angirasa; Deity: Surya;
Metre: Tristupa

1. Eye of Mitra, Varuna and Agni and front army of gods has risen. He has pervaded heaven, earth and atmosphere. Surya is the soul of moving and unmoving.

2. Surya follows radiant goddess Usa like a man follows a beautiful woman, where men desiring to become god stretch time by good deeds for welfare of people.
3. Auspicious green horses of Surya are wonderful, pleasing and always moving. Venerables spread on the surface of heaven and immediately go round earth and heaven.
4. That is the glory and godliness of Surya that he pulls away his rays in the middle of actions. When he pulls away his green horses from world, night spreads its cloth for him.
5. That Surya creates forms near heaven for observation of Mitra and Varuna. His green horses take two forms, one of infinite brightness and vigor, and other black.
6. O gods! Protect us from sins and blamable deeds when Surya is rising. Let Mitra, Varuna, Aditi, Sindhu, earth and heaven express approval for our statements.

In the first verse Surya is called the eye of Mitra, Varuna and Agni. In Rgveda 7.63.1 also Surya is called the eye of Mitra and Varuna. Similar views are expressed in verse five quoted above as well. Mitra and Varuna have been identified with electron and proton earlier. How do protons and electrons find out what is around them? They continuously send signals all around them. These signals are electromagnetic waves, and light is also electromagnetic wave. It is in this sense that Surya is considered the eye of Mitra and Varuna. When this scientific meaning was forgotten, Surya, Mitra and Varuna along with many other gods came to mean just sun. In verse five, horses of Surya are said to take two forms, bright and black. These two forms are that of particle and anti-particle. The Rgveda calls particle form bright and anti-particle form black or dark.

The field properties of light are described in the Rgveda by calling Surya as Sociskesa, having inflamed hair (1.50.8), or Kesina, having fine hair (1.164.44,10.136.1) or Harikesa, having green hair (10.37.9). Having inflamed hair signifies that field is

another form of energy. Surya is described as having green hair and his chariot is also driven by green horses. Both of these descriptions describe same phenomenon, which has nothing to do with either hair or horses. Number of horses driving the chariot of Surya is seven.

"Seven draw the chariot of Surya, one horse having seven names draws the chariot." Rgveda 1.164.2

"Seven horses draw the chariot of Surya" Rgveda 5.45.9

These seven horses are the seven colors comprising light. These seven colors become visible in a rainbow or when light passes through a prism. Green color was chosen to represent light as green light falls in the middle of electromagnetic spectrum comprising seven colors of light.

In modern physics light is considered a wave as well as particle. Light particle is called photon. In the Vedas Gau particle seems to be related to the concept of photon. Cows of sun are mentioned in Rgveda 7.36.1. This would mean Gau particles of light. Photons have a very special property. They are considered massless, meaning they do not have any rest mass. The Yajurveda also has same opinion about Gau particle.

"What does not possess mass?" Yajurveda 23.47

"Cow does not possess mass." Yajurveda 23.48

Reader should note that these verses can not apply to an animal called cow. The information in the Vedas is coded, and only those who were familiar with the code could understand the meaning of the Vedas. The Vedic code was gradually forgotten over time, but some part of the code was remembered up to the first half of this millenium. A very surprising piece of evidence to this effect

has surfaced up recently. Professor Subhash Kak has discussed in a recent article the value of the speed of light as given by Sayana[1]. Sayana (1315-1387 A.D.) was the prime minister in the court of Emperors Bukka I and his succesors of the Vijayanagar empire. Sayana was a well known Vedic scholar. In his commentary on Rgveda 1.50.4, he says that sun (Surya) traverses 2,202 yojanas in half a nimesa. Yojana is an ancient
Indian unit of length, and nimesa is the unit of time. Upon conversion into modem units, this yields the value of 186,000 s miles per second for the speed of sun. Now, it is well known that speed of light is 186,000 miles per second. Thus Sayana was describing the speed of light, and not that of sun, following the Vedic tradition of coding the knowledge.

How did light originate? The Vedas provides various clues:

Gods took out Surya from ocean." Rgveda 10.72.7
Indra created Surya." Rgveda 2.12.7
Indra and Visnu created Surya." Rgveda 7.99.4
"Surya was created by Usa." Rgveda 7.78.3
"Sun was bom from Vrtra." Atharvaveda 4.10.5

These verses are saying that light originated due to expansion of the universe by electric force. The Rgveda is very clear that Surya resides in the light space, and not in the observer space or intermediate space.

"Surya is son of heaven." Rgveda 10.37.1
Indra and Soma established Surya above." Rgveda 6.72.2

It is for this reason that I have given the scientific name of heaven as light space. Energy has three principal forms in three spaces, Surya in heaven, Vayu in atmosphere and Agni in earth. It is for this reason that Vayu and Agni are called brothers of Surya in Rgveda 1.164.1. Surya is also very intimately associated with goddess USA. Rgveda 1.115.2 says that Surya follows USA like a man follows a beautiful lady. We will take up the discussion of USA next to understand the meaning of this mantra.

"I 'saw' cascades of energy coming down from outer space, in which particles were created and destroyed in rhythmic pulses; I 'saw' the atoms of the elements and those of my body participating in this cosmic dance of energy; I felt its rhythm and I 'heard' its sound, and at that moment I knew that this was the Dance of Siva, the Lord of Dancers worshipped by Hindus."

- Fritjof Capra

14. The Dance of Creation

Two words for the world in Sanskrit are Jagata and Samsara. Jagata means one that is continuously moving and Samsara means one that is always flowing. It was well understood by the Vedic sages that everything in the universe is continually moving. So much is going on behind the scene. So many changes are taking place inside what looks like unchanging to us. The concept of two goddesses, USA and Nakta, are related to the dynamics of changes unseen by us.

14.1: USA (Dawn)

There are twenty complete hymns dedicated to Usa in the Rgveda 04M9,1.113,1.123-124,3.61,4.51-52,5.79-80,6.64^5,7.75-

81, 10.172). Hymns dedicated to Usa are subtle and beautiful. It is right time to go through a beautiful hymn dedicated to Usa.

Rgveda 1.123 Sage: Kaksivana
Dairghatamasa Ausija; Deity: Usa; Metre:
Tristupa

1. Grand right-handed chariot of Usa has been assembled and immortal gods have taken their seat on it. Leaving behind and rising from black darkness, kind Usa intends to provide dwelling for mankind.
2. She wakes up before the whole universe does. She wins riches and donates generously. First to be invoked Usa has come and the young lady, who takes birth again, has started watching from high place.
3. Well-born goddess Usa gives the share of wealth to mortal men today. Let dear god Savita say here for Surya that we are sinless.
4. Everyday she goes to every home and takes form. Wishing to obtain the oblations bright Usa always comes and procures the first riches.
5. First to be praised joyful Usa is sister of Bhaga and sibling of Varuna. Let's win by your right-handed chariot and the holder of sin be caught.
6. Songs of joy be told in abundance and fires be kindled. Let desirable wealth hidden in darkness be manifested by shining Usas.
7. One comes towards, other goes away. Having opposite forms they travel one after another. One covers everything in darkness, other manifests them by radiant chariot.
8. They are similar today and they will be similar tomorrow. They care for vast abode of Varuna. Each blemishless Usa goes round thirty yojanas instantly.
9. Knower of the name of the first part of the day, white pure

Usa manifests from darkness. Young woman does not break the universal law and moves separating one day from another.
10. Like a lady revealing her body, Goddess goes to the God to fulfill wishes. Radiant lady shows her breasts in front of him smilingly.
11. Like a young lady adorned by mother, beautiful Usa shows her body. You noble lady keep shining up to far away places. Other Usas can not compare to you.
12. Possessing cows and horses and chosen by all, they try to dispel darkness by sun's rays. Usas holding auspicious names go far away and come back again.
13. O Usa, living in accordance with rays of cosmic order, give us the desire to perform noble work. Keep shining before us. Give wealth to us and rich people.

In verse two Usa is described as first to be invoked and in verse six Usa has been asked to manifest the wealth hidden in darkness. This wealth is not ordinary wealth, but the stuff that the universe is made of. Everywhere in the universe the process of creation and annihilation of particles is going on all the time. New particles keep on taking the place of old ones, creating an illusion of permanency. Usa is the name for the creation of particles. The process of creation starts with Usa and therefore she is the first to be invoked. Usa has been frequently described as showing her body in the Rgveda. As Usa manifests the unmanifested, she is visualized as showing her body. Frequently more man one Usa is mentioned as in verse twelve. This is because many particles are being created simultaneously everywhere and particles have a very short life span. Tilak argues that Aryans lived in Arctic region before the diaspora based on the description of several dawns[l]. He argues that Arctic region has a very long dawn, which is described as being equivalent to many dawns of the Indus Valley. This argument is not very logical, as a long dawn will still be described as one dawn, and not as many dawns.

Usa shows her breasts like a dancer (Rgveda 1.92.4). Usa keeps her breasts open (Rgveda 6.64.2). Figure 14.1 shows a famous statue from the Indus Valley known as the dancing girl. We can now be more specific than that. This figure is that of Usa. Usa has been described as a nude dancing girl in the Rgveda, which is a perfect match with the figure. Also, the pose of the dancing girl is a classical Indian dance form.

In verse one and five word "daksinaya" has been used as adjective of the chariot of Usa. Satavalekar translates it as dexterous, which does not seem correct. Daksa means dexterous, but word "daksinaya" is related to daksina meaning right or south. This seems to be related to the spin of the particles. In the Rgveda Surya is often described as following Usa. This may represent emission of photon (light particle) accompanied by the creation of particles. As light is represented by sun in the Vedas, this also gives us a clue as to why dawn was chosen to represent creation of particles. Usa is called Divoduhita, daughter of heaven, in the Rgveda. This is because the process of creation starts in light space. There is a continuous interaction between light space and observer space with energy changing into particles and particles changing into energy.

Verse seven describes Usa and Nakta. Nakta is described as covering everything in darkness. We will take up the discussion of Nakta now to get further insight in the process of annihilation of particles.

14.2: Nakta (the night)

Nakta means night, but that is not the intended meaning in the Vedas. Usa represents the creation of particles and therefore Nakta represents the annihilation of particles. It is time to further investigate if this interpretation is supported by the Vedas. In Yajurveda 23.11 following question is raised:



Figure 14.1: Usa, the dancer, a statue from Indus Valley

"What object is Pilippila and what object is Pisangila?"

Pilippila is something that is very soft and presses very easily. Pisangila means one who devours. The answer is given in the next mantra of the Yajurveda.

"Avi is Pilippila and night is Pisangila?" Yajurveda 23.12

Here Avi particle is described as soft and night is described as devouring all the forms. However, the inquirer is still curious and asks the question again to get a definite answer. Then he gets the following answer.

"Aja is Pisangila, who like a dog gets things out and devours it again." Yajurveda 23.56

Here Aja particle is related to night as both are described as devourer. Reader should recall that Aja is the intermediate stage between manifestation of energy into matter particles and vice versa. Thus Aja creates forms as well as annihilates forms. In this way Aja is related to Usa and Nakta both. The relationship of Nakta with annihilation of particles is made clear in the following verse from the Rgveda as well, where Nakta is related to Savita.

"Night was created for the birth of Savita." Rgveda 1.113.1

Savita is the creation-annihilation energy of the particles, and as the annihilation energy Savita is related to night. As with many other Vedic themes, the depiction of the cosmic dance of creation and annihilation went through changes during the age of the Puranas.

14.3: Lord of the Dancers

Creation and annihilation of particles is a continuous process. Everywhere in the universe this process is going on. The Vedic sages envisaged this process as a cosmic dance of creation, and therefore Usa is represented as a dancer. In later Hinduism this dance of creation is represented by the cosmic dance of Lord Siva. It is for this reason that Lord Siva is also called Nataraja, the Lord of the dancers. This dance is the creation and annihilation of matter and anti-matter. Energy changes into a pair of matter and anti-matter particles and when a particle and its anti-particle collide, they change into energy. We will take up the production of a pair of matter and anti-matter particles in the next chapter.

I believe that the discovery of particles and anti-particles by Dirac has changed our whole outlook on atomic physics."
- Heisenberg

15. Pair Production

Male and female species form a pair in animal kingdom. A similar relationship exists in the particle world. Particles are also formed in a pair. Our universe is dominated by a set of particles, which we call matter. The opposite pairs of these particles are called anti-particles and the set of these anti-particles is called antimatter. When a particle meets its anti-particle, they annihilate and change into energy. Energy under certain conditions changes into a pair of particle and anti-particle. The Vedas describe the opposing nature of matter and anti-matter in several ways.

15.1: Matter and Anti-matter

The Vedas describe matter and anti-matter as twins. This is indeed a perfect description, as particle and its anti-particle are born me same womb (energy). Sometimes these twins

are described as both sisters and sometimes as one brother and other sister. As these descriptions are not of human beings, these analogies are valid.

"Two female twins manifest in various forms. Out of them, one is white and other is black. The black and white females are sisters. This is one of the great deeds of gods." Rgveda 3.55.11

The Vedas describe matter as white and anti-matter as black. Universe consists of matter and anti-matter. A verse from the Rgveda describes this.

"Those born together were divided in two forms." Rgveda 1.62.7

Opposite forms can have two meanings, matter and antimatter, or positive and negative electric charge. A positively charged particle attracts a negatively charged particle. Following verse describes this phenomenon.

"Two women having opposite forms breastfeed each other's child." Rgveda 1.95.1

Our universe is matter dominated. If matter and anti-matter are created together in same amount, then we should find equal amount of anti-matter. Why is it that we don't find much evidence of anti-matter as far as we can observe. Are remote parts of the universe anti-matter dominated? Did matter and anti-matter somehow get segregated in different corners of the universe. Scientists do not think so. Scientists believe that when universe was very young, for some reason a small excess of matter over anti-matter was generated. As matter and anti-matter annihilated each other, this small excess remained, and that small excess is our universe. The Vedas take a different view. According to the Vedas matter and energy are constantly being created at the surface

of the universe, and there is an imbalance in their creation. Matter and anti-matter continually annihilate each-other and the small excess of matter has accumulated over the age of the universe. Following verses describe the annihilation of anti-matter.

"Indra killed all the female servants of black origin."

Rgveda 2.20.7

"Everyday Indra removed half of the people, similar to the other half but black in color, born in his house." Rgveda 6.47.21

Indra is considered responsible for killing of black people in the Rgveda. As matter and anti-matter are attracted towards each other due to opposite nature of electric charge resulting in annihilation, electric force is indeed responsible for this phenomenon. The Rgveda contains a beautiful dialogue between a particle and its anti-particle in the tenth book. The particle is represented as a brother and its anti-particle as his twin sister.

15.2: Yama and Yami

Yama is depicted as the god of death in the popular form of Hinduism. His form is very different in the Vedas.

Rgveda 10.10 Sage: 1,3,5,7,9,11,13 - Yami, rest - Yama;
Deity:1,3,5,7,9,11,13 - Yama, rest - Yami; Metre: Tristupa, 13
-
Viratasthana
.

1. Yami: I want to choose my friend (Yama) as my husband. He has entered the foaming ocean of youth. Now I am mature to give birth, and I want you to establish in my womb your father s grandson.

2. Yama: Your friend (Yama) does not want this kind of friendship, because own sister is not suitable (for marriage). Great brave sons of Asuras, who hold the heavens, see everything.

3. Yami: Though for a mortal this friendship is unsuitable, the immortals do want this contact. You should fall in love with me, and join with my body as a virile husband.

4. Yama: We have never done this before. We speak truth, we never spoke lies. Gandharva and young woman in Apah are our navel, and we have close relationship.

5. Yami: All-pervading Tvasta has made us couples in womb itself. No one can break his laws. Earth and Heaven know our relationship.

6. Yama: Who knows about the first day, who has seen it, who can tell? The abode of Mitra and Varuna has wide expanse. Why are you saying all this filled with imagination leading to downward fall?

7. Yami: In Yami desire has arisen for Yama to sleep with him at same place. Like a wife joins her body with husband's, we should also do so. Let's work together like two wheels of a chariot.

8. Yama: The spies of gods who move around here, (they) don't stop anywhere, don't close their eyes even for a moment. Go with someone else and work together with him like two wheels of a chariot.

9. Yami: Let the sun shine, days and nights fulfil our desires. Let's be couple like earth and heaven. Let Yami become Yama's wife.

10. Yama: Those times will come later, when sisters will have unsuitable relationship with brothers. O beautiful, choose someone else as your husband, and hold him in your hands.

11. Yami: What of the brother, whose sister is helpless. What of the sister, who can not alleviate the pain of the brother. Caught with desires I am saying so much to you, join your body with my body.

13. Yama: I will not join my body with your body. Who sleeps with his sister, (people) call (him) sinner. Enjoy with someone else. O lucky, your brother does not desire this relationship.
14. Yami: You are a coward. I could not fathom your mind and heart. Does someone else hug you like a creeping plant goes around a tree or a rope binds a horse.
15. Yama: Yami, you should also hug someone else like a creeping plant goes around a tree, that someone else also hug you. You should desire him, he should desire you, and you enjoy life with him.

Yama means twin, and here one of the twins is called Yama and other his sister Yami. This beautiful dialogue, which is cited as prohibiting the union of siblings, is not about the illegitimate relationship at all. This is a dialogue between a particle and its anti-particle. If they join together, they will change into radiation and material universe will not evolve. The Vedas are written from the viewpoint of an existing universe, and sages celebrate the important physical processes leading to the present state of the universe. The stress here is that the material universe has evolved due to one particle combining with another particle to generate a third particle and so on. This is why Yami is told to join with someone else, not her own anti-particle. Verse two says that sons of Asuras see everything. Verse eight says that spies of gods don't stop anywhere and don't close their eyes even for a moment. Who are these sons of Asuras and spies of gods? In the Vedas Varuna is often called Asura. Varuna has earlier been identified as electron. Spies of Varuna are often mentioned in the Vedas.

"Nobody can deceive the spies of Varuna." Rgveda 6.67.5

"Varuna's spies see everything by their thousand eyes."
Atharvaveda 4.16.4

The electron keeps on sending virtual particles all around it to find out about its neighbors. In this way the electron keeps an eye on everything around it. These spies are called dogs in the Rgveda.

In Rgveda 1.24 there is a beautiful prayer by a virtual particle Sunah Sepa to Varuna (electron) asking Varuna to free him. This prayer becomes the basis of a long story in Aitareya Brahmana 7.3.1-6. King Hariscandra had one hundred wives, but he had no son. He prayed to Varuna for a son and promised to sacrifice him. Varuna granted his wish and soon his son Rohita was bom. Varuna asked Hariscandra to sacrifice his son Rohita. Hariscandra said that an animal becomes eligible for sacrifice when it is ten days old. He would sacrifice Rohita when he became ten days old. Varuna said let it be so. When Rohita was ten days old, then Varuna reminded Hariscandra again. Hariscandra said that an animal is sacrificed when it has teeth. He would sacrifice Rohita when he had teeth. Varuna said let it be so. Varuna reminded Hariscandra again after Rohita had teeth. Hariscandra said that an animal is sacrificed when its first set of teeth fall. He would sacrifice Rohita when his teeth fell. Varuna said let it be so. In this way Varuna kept reminding him and he kept postponing the sacrifice of his son Rohita. When Rohita came to know of his father's promise to sacrifice him, he left home and started living in a forest. Varuna became angry and inflicted Hariscandra with dropsy disease. Upon hearing this Rohita wanted to return, but Indra stopped him several times. In forest Rohita met sage Ajigarta dying with hunger and thirst. Ajigarta had three sons, Sunah Puccha, Sunah Sepa and Sunolangula. Rohita said that he would buy one of his sons for one hundred cows and sacrifice him to fulfil the promise made to Varuna. Ajigarta said that the eldest son is the dearest to him, and his wife said that the youngest son is the dearest to her. So they sold Sunah Sepa to Rohita. Varuna agreed to the sacrifice of Sunah Sepa in place of Rohita. When nobody was found willing to tie Sunah Sepa to a post for sacrifice,

his selfish father Ajigarta agreed to do so for one hundred cows. Sunah Sepa was tied to the post from head to toe. When nobody was found willing to sacrifice Sunah Sepa, his selfish father Ajigarta agreed to do so for one hundred cows. At this point Sunah Sepa started to pray to gods by the mantras in Rgveda 1.24-30.

very happy to hear his prayers and released him. In the post-vedic literature we find the development of minor themes of the Rgveda in long captivating tales. There is a beautiful dialogue between the spy of the gods and the guardians of cows in the tenth book of the Rgveda and this is the subject of our further investigation.

15.3: Sarama and Pani

Panis are described as the mighty enemies of Indra. They are hiding the cows, which Indra desires to obtain. Indra sends Sarama to negotiate on his behalf.

Rgveda 10.108 Sage: 2,4,6,8,10,11 - Devasuni Sarama, rest - Panis; Deity: 2,4,6,8,10,11 - Panis, rest - Devasuni Sarama; Metre: Tristupa

1. Pani: Sarama, you have come here with what desires? The road leading here is very long. What is your aim in this? How did you spend the night? How did you cross the rivers?
2. Sarama: I am the messenger of Indra, and I am roaming under his wishes. I want your great treasures. From the fear of all-transgressing (Indra), that (river) protected me. Thus I crossed the river.
3. Pani: O Sarama, what does Indra look like, what is his vision, yon nave come so far away becoming his messenger. (Panis talk among themselves) If (Sarama) becomes our friend, (we) uphold and let her become the owner of cowherds.

5. Sarama: I don't know of him being beaten, he beats everyone, becoming whose messenger I have come from far away. O Panis, flowing deep currents can't hide him, you will certainly be lying on the ground killed by Indra.
6. Pani: O lucky Sarama, desiring these cows you have reached the edges of heaven, how can anyone let them go without a war, and our weapons are also very sharp.
7. Sarama: O Panis, you don't talk like good armies. Though (you) sinners' bodies can't be wounded, and the roads leading here are invincible, in either case Brhaspati won't let you live happily.
8. Pani: Our treasure is rooted in rock and is full of cows, horses and other riches. These great protector Panis protect these treasures. You have come to this suspenseful place in vain.
9. Sarama: Soma-drunk Navagva, Angirasa and Ayasya sages will come here. They will divide the cows. Therefore you should abandon these great-sounding talks.
10. Pani: O Sarama, looks like you have come here forced by the gods. Let's make you our sister. Don't go back. O lucky, we will even give you a part of our cowherd.
11. Sarama: I don't know brotherhood or sisterhood. Indra and dreadful Angirasa know that. They sent me desiring the cows, so I have come. Therefore go far away from here.
12. Sarama: O Panis, go far away from here. Cows go upward by Rta. Brhaspati, Soma, Gravana, Vipras and sages have come to know these very secretly hidden treasures.

Sarama is called DevasunI meaning bitch of the gods in the Rgveda. If there is still any confusion left about Sarama being a dog, Rgveda 10.14.10 says that Sarameya, children of Sarama, are two dogs with four eyes. Obviously, the dialogue is meaningless, if you don't know what the Vedas are about. Dogs can not talk to human beings, but this has not prevented proponents of the Aryan Invasion Theory to make a nice tale

about the pastoral culture of Aryans. Cows of Aryans have been stolen by Panis. They send Sarama to find out about the stolen cows. She finds out the cows and asks Panis to part with them, but they refuse. Then Indra goes and recovers the cows. Actually this dialogue is not about cows and dogs.

First few verses tell that Sarama has traveled very far to find the cows, and in verse five it is made clear that she has reached all the way to the edge of the heaven. The edge of the heaven is the boundary of the universe. This phenomenon is taking place at the very edge of the universe. There is no indication in this dialogue that cows have been stolen by Panis. They own the cows and Indra, Brhaspati and other sages want those cows. Panis are very strong enemies. Reader should recall that the forces of expansion and contraction are in a very delicate balance. Indra indeed has very strong enemies to defeat. Panis are hiding cows, horses and other riches in rocks. We have also seen that the boundary of the universe is called mountain in the Vedas. What lies beyond this boundary is thus rooted in rock. Cows, horses and other riches that Sarama wants, have not manifested yet. They will, once the universe expands further, and therefore Brhaspati knows about the secretly hidden treasure. Cows and horses are the fundamental particles that will be created once the universe expands further. Thus we find that this dialogue between Sarama and Panis is another way of representing the creation of matter and energy due to expansion of the universe. This is the most crucial point of the Vedic cosmology, and therefore it is told again and again in various ways. In this dialogue Sarama is made messenger of Indra. Electric force acts by the exchange of virtual particles, and thus virtual particles can be considered the forerunners of electric force. At this stage one question arises about Panis. Are they supposed to be same as Vrtra? The declaration of Panis and Vrtra in the Rgveda does not warrant this conclusion. Both are opposed to expansion of the universe. Vitra has been identified as surface tension of the universe, which

opposes the expansion. Another force that opposes the expansion is the force of gravitation. Further research is needed to verify whether Panis represent force of gravitation. Verses eight and eleven tell that sages are also involved in this cosmic game of creation. What is the role of the sages? What do they represent? We will take up the discussion of the sages in the next chapter.

"Such, in outline, but even more purposeless, more void of meaning, is the world which science presents for our belief. Amid such a world, if anywhere, our ideals henceforward must find a home. All the labors of the ages, all the devotion, all the inspirations, all the brightness of human genius, are destined to extinction."

- Bertrand Russell

16. Seven Sages

Verses of the Vedas are preceded by the description of sages, deities and metres. There are two major definitions of the Vedic sages. Nirukta 2.11 says that sage is because of seeing. The verses have been realized by sages during deep meditation. On the other hand, Rgveda Sarvanukramani 2.4 says that who speaks the verse is the sage of that verse. By generalizing this definition rivers, serpents and birds are considered sages as well, because dialogues have been spoken by them. It is obvious then that the actual sage of those verses is someone else who has chosen to make animals or inanimate objects speakers. There are several problems in accepting the given names of sages as the composer of the respective verses. Some verses are repeated in the Vedas, and verses are ascribed to different sages at different places.

Many times more than one sage are associated with one verse. Sometimes the number of sages for the same verse goes to hundred (Rgveda 9.66). In some cases it is obvious that the names of sages are not of actual people, but they are symbolic representations of the ideas conveyed by the mantras. For example verses of Yajurveda 34.1-6 end with "tanme manah Sivasankalpamastu" meaning let my mind be of good intentions. Sage of these verses is Sivasankalpa meaning good intention. Sometimes gods themselves become sages for some verses. Agni is the sage as well as deity of Rgveda 10.140. Thus it stands to reason that the names of sages are symbolic. I am going to take an extreme position by stating that none of the sages mentioned in the Vedas were actual people. Actual sages have not left their names, and all of the names of the sages found in the Vedas have a precise scientific meaning. This means that Vasistha, Visvamitra and names of other famous sages are not names of actual people. If this is the case, then how are we going to find out the actual meaning behind sages? Our biggest clue is the name itself, because every word in the Vedas has an etymological meaning. Furthermore, there are description of sages scattered in the Vedas. Hopefully, wise sages have left enough clues to make an unambiguous identification. With this objective in mind I will describe a beautiful hymn related to the birth of Vasistha.

16.1: Vasistha

Books two to eight of the Rgveda are considered family books, as each book is written by a sage and his family members. Authors of these seven books of the Rgveda are known as seven sages. Seventh book of the Rgveda is written by Vasistha and his family members. The description of Vasistha and his sons provides vital clues about the identification of sage Vasistha.

Rgveda 7.33

Sage: 1-9 - Maitravaruni Vasistha, 10-14 - sons of Vasistha:
Deity: 1-9 - Sons of Vasistha or Indra, 10-14 - Vasistha;
Metre: Tristupa

1. (Indra says) Whitish, having braided hair on right side, living wisely have pleased me. Rising from the seat I told men that Vasisthas don't go far from me.
2. Brought ferocious Indra, who drinks from Soma vessel, from very far away. Indra chose Vasisthas over Soma prepared by Vayata Pasdyumna.
3. Which Sindhu was crossed in this way? Which Bheda was killed in this way? O Vasisthas, in this way which Sudasa did Indra protect by your hymns in the battle often kings?
4. O men, from your Brahma our forefathers get satisfaction, let the axles do not fail. O Vasisthas, hold strength in Indra by the loud sound in Sakkari.
5. Thirsty, surrounded and seeking help, (Vasisthas) praised (Indra) in the battle of ten kings like heaven. Indra heard the prayers of Vasistha and created wide region for Trtsus.
6. Like the rods for prodding cows, Bharatas were small and divided. Vasistha became the town of Trtsus, and Trtsus' settlement began to extend.
7. Three create seed in Bhuvanas, three are the offsprings of Arya who stay in front of light. Three are the Dharmas which serve Usas, Vasisthas know them all.
8. O Vasisthas, your greatness is spread like sun's light, is deep like ocean,'has speed like air. Your hymns can not be matched by anyone.
9. From the knowledge of the mysteries of heart, they walk among thousand twigs. Weaving that enclosure by Yama, Vasisthas sit among the Apsaras.
10. Vasistha, Mitra and Varuna saw you radiating electric light, that was your one birth when Agastya held you in place.

11. Vasistha, you are son of Mitra and Varuna. O Brahmana, you are born from the mind of Urvasi. By heavenly hymns drop (of semen) fell, all the gods held you in lotus.
12. He has the knowledge of both. He gives thousands or everything. Weaving that enclosure by Yama, Vasistha was born from Apsara.
13. Born in Satra, instigated by hymns (they) dropped seed in a vessel simultaneously. In the middle "Mana" manifested, from that sage Vasistha was born.
14. Offering verses, offering chants, carrying Gravana (stone), he is speaking. Vasistha is coming. Offer him respect with warm feelings.

Vasistha means a place to live and is derived from root "Vas" meaning to live. In verse six, Vasistha is referred to as a town (Pura) for Trtsus. The question is what is the scale of Vasistha's extent? Is it atomic level or cosmological level? In the first verse Vasisthas are described as having white color. White color has two possible connotations. It either represents matter as opposed to anti-matter, or it represents positive charge as opposed to negative charge. Here I will choose it to mean that Vasisthas are positively charged. Same verse also describes Vasisthas as having braided hair on right side. This could represent spin of atomic particles. Indra says that Vasisthas can not go far from him, which means that being positively charged Vasisthas give rise to electric force, and thus Indra is always near them. Second verse enforces the idea of Vasisthas having electric charge by saying that Vasisthas carry Soma.

Verse three is a very important verse as it talks about the famous battle of Sudasa and ten kings. Every historian believes it to be a historical battle, and many of them relate it to the victory of Aryans over Dravidians. Sudasa means a good Dasa, and Dasas are supposed to be Dravidians. So if this was a battle, it would mean a victory of Dravidians over Aryans. However this was not

a historical battle at all. The verse asks which Sudasa was protected by Indra? Certainly Sudasa can not be a proper name if it is preceded by which.

Verses ten to thirteen are important in identifying Vasistha. Vasistha is born from Apsara. Apsara means flowing from Apah. Thus Apsara means the electric field surrounding the charged particles. One of the Apsaras is Urvasi, mother of Vasistha. Obviously Vedic scientists gave different names to electric fields associated with different charged particles. Verse eleven says that Mitra and Varuna are fathers of Vasistha. Full name of Vasistha is Maitravaruni Vasistha, where Maitravaruni means son of Mitra and Varuna. This is certainly impossible if Vasistha was a human sage. Having identified Mitra as proton, Varuna as electron and Vasistha as a place to live, it is tempting to identify Vasistha as atomic nucleus or atom. Atomic nucleus fits the description exactly as Vasistha has white color and atomic nucleus is positively charged. Urvasi can then be identified as the electric field inside the atom. Mana is derived from root "ma" to measure. Creation of Vasistha from Mana signifies that size of nucleus is not arbitrary, but well measured depending on the strength of atomic forces. Another important point is that Agastya holds Vasistha. As the reader will recall, Agastya means fixed, not moving. Atomic nucleus is also fixed relative to the electrons surrounding it. Nucleus is very heavy compared to electrons, and for this reason is very immobile compared to electrons. Thus I see a very good match between properties of Vasistha and atomic nucleus. Another strong corroboration comes from prayers by sage Vasistha to Varuna.

"When will I be inside Varuna?" Rgveda 7.86.2

We will live inside Varuna sinless." Rgveda 7.87.7

As the atomic nucleus is surrounded by electron cloud, these verses make exact sense. The prayers of Vasistha and his family members are compiled in the seventh book of the Rgveda. One prominent feature of this book is that sages are asking for good and beautiful homes. If seven family books of the Rgveda are arranged according to some important chronological markers, then this book represents the era when atomic nuclei started to be formed.

The birth of Vasistha is a very important event in the Vedic cosmology, and it is not surprising that it is described on a seal from the Indus Valley. Figure 16.1 shows this seal from Mohenjo-daro (M-1186). This seal is known as "fig-deity" seal. Seven human figurines in the bottom row represent the seven sages of the Rgveda. Human figurine inside the jar is sage Vasistha. According to Rgveda 7.33.13 Vasistha was born in a vessel. Human figurine outside the jar is sage Agastya. Rgveda 7.33.10 describes Agastya as holding Vasistha in place. Fish sign represents Mitra and Varuna. Mitra and Varuna oversee the universe without blinking their eyes, and fish is also known as keeping its eyes open even while sleeping.

In the Puranas sage Visvamitra becomes a bitter rival of sage Vasistha. However, there is no rivalry between these sages in the Rgveda. Sage of the second book is Grtsamada Bhargava Saunaka. Grtsamada means wise and happy, Bhargava is derived from root "Bhraj" to illuminate and Saunaka means related to dog. Dog represents virtual particles in the Vedas. Sage of the third book is Gathina Visvamitra. Gathina means singer and Visvamitra means friend of all. Sage of the fourth book is Vamadeva Gautama. Varna means lovely as well as left and Deva means god. Gau means cow and Tama means darkness. Sage of the fifth book is Atri. Atri means devourer, and is derived from root "Ad^{M} to eat. Sage of the sixth book is Bhardvaja. Bhardvaja means carrying high speed or strength. Sage of the eighth book is Kanva. Kanva is derived from root "Kan" meaning a minute particle. Further



Figure 16.1: Birth of Vasistha, a seal from Mohenjo-daro (M-1186)

research is needed to understand the scientific meaning of these sages. Having discussed the meaning of sages, it is now time to take a closer look at the Vedic concept of deities.

"I want to know how God created this world. I am not interested in this or that phenomenon, in the spectrum of this or that element. I want to know His thoughts, the rest are details."
- Albert Einstein

17. The Gods Gallery

Hindus are often put on defensive by the followers of Semitic religions, who attack Hinduism for being polytheistic. Logically, monotheism has no superiority over polytheism. That being so, it should be kept in mind that Hindus worship different gods only as a manifestation of one god in different forms. Hinduism is a religion of symbols, and each symbol has a specific meaning. So far we have found the scientific meaning of several gods described in the Vedas. The Vedas describe the universe to be divided in three spaces, and accordingly gods also have a specific place in the universe.

17.1: Three-fold Division

Though a large number of gods are described in the Vedas, it was well understood that the gods are essentially three, one belonging to each space.

"There are three gods: Agni in earth, Vayu or Indra in atmosphere and Surya in heaven. Each one of them is known by various names depending on the different actions performed."   Nirukta 7.5

"There are three gods: Agni in earth, Vayu in atmosphere and Surya in heaven."   Katyayana in Sarvanukramani 2.8

This view finds support from the following verse in the Rgveda itself.

"Let Surya protect us from enemies in heaven, Vayu in atmosphere and Agni in earth."   Rgveda 10.158.1

These three gods are three major forms of energy, as matter in observer space, field in intermediate space and light in light space. Apart from this three-fold division of gods, the Vedas also talk about thirty three gods.

17.2: Thirty Three Gods

Sometimes Hindus are ridiculed for worshipping 330 million gods. The source of this misconception is the description of thirty three gods in the Vedas.

"Thirty three gods take part in Yajna."   Rgveda 1.139.11

"Three more than thirty gods came to Yajna, knew our desires, and gave us two kinds of wealth."   Rgveda 8.28.1

"O three plus thirty gods, you are worthy of praise." Rgveda 8.30.2

Who are these thirty three gods? The Vedas do not provide the names of these gods. In Satapatha Brahmana 14.6.9.3 they

have been described as eight Vasus, twelve Adityas, eleven Rudras, Indra and Prajapati. This is definitely wrong, and shows the loss of knowledge of the Vedic science. The Vedas are very clear about the division of gods.

"O Asvins, come here to drink honey with three times eleven gods." Rgveda 1.34.11

"There are eleven gods in heaven, eleven gods in atmosphere, and eleven gods in earth." Yajurveda 7.19

Thus the description of thirty three gods has to satisfy the criteria of placing eleven gods in each of the three spaces, and obviously the Satapatha Brahmana fails there. It seems that the concept of thirty three gods is related to the geometry of the universe. In the Puranas a massive mix up takes place. The Vedas describe gods as of thirty three type (Koti). Koti has additional meaning of ten million. Due to this mix up in two meanings of the word Koti, number of gods suddenly jumped from thirty three to 330 million.

17.3: The Age of Puranas

During the age of Puranas, massive upheaval took place in the depiction of Gods. The Puranas were written for the masses. On one hand the Puranas had to remain faithful to the Vedas, and on the other hand they had to keep ordinary people interested in Dharma. As a result the science of the Vedas was given the form of long engrossing tales of fight between gods and demons. Visnu took the place of supreme Godhead. Indra became his sub-ordinate, and most of the time he had to worry about saving his kingdom from demons. Often demons became too powerful and expelled Indra and other gods from heaven. Vedic god Rudra

now became Siva. Five gods attained prominence during this period: Visnu, Siva, Sakti, Surya and Ganesa. Accordingly there were five main sects of Hindus, Vaisnava, Saiva, Sakta, Saura and Ganapatya. Gradually Ganapatya merged with Saiva, and Saura merged with Vaisnava leaving only three prominent sects Vaisnava, Saiva and Sakta. The process of coding of the knowledge started by the Vedas continued in the age of the Puranas. One example of this coding is the story of ten incarnations of Lord Visnu.

17.4: Incarnations of Visnu

The names of ten incarnations of Visnu are given in Mahabharata, Santi Parva.

"Matsyah Kurmo Varahasca Narasimho atha Vamanah.

Ramo Ramasca Ramasca Krsnah Kalkiti te dasa."

Ten incarnations in chronological order are fish (Matsya), tortoise (Kurma), boar (Varaha), half man-half lion (Narasimha), dwarf (Vamana), Rama, Rama, Rama, Krsna and Kalki. Three Ramas in chronological order are Parasurama, Rama and Balarama. Ten incarnations of Lord Visnu tell the story of evolution and therefore it is important to keep them in chronological order. First incarnation is fish, which lives in water. Fish incarnation corresponds to the beginning of life in water. Second incarnation is tortoise, which can live in water and on land as well. Tortoise incarnation represents the transition of life from water to land. Third incarnation is boar, which lives on land. At this stage transition from water to land is complete. Next incarnation is half man-half lion representing the evolution of life forms with higher intelligence than previous ones, somewhere in between lower animals and man. Fifth incarnation is dwarf

incarnation. This is the stage of primates, who have not yet learnt to stand erect. Sixth incarnation is that of Parasurama. Parasu means an axe and Parasurama is depicted as holding an axe. This represents the primitive man of stone age who is using stone tools for hunting. Next incarnation is that of Lord Rama, who is represented as carrying bow and arrow. Now the human being is further down the road of civilization and using bow and arrow for hunting. Eighth incarnation is that of Balarama, who is represented as carrying plough on his shoulder. Now the man has settled down and is using agriculture for sustenance. Ninth incarnation is that of Krsna representing modem man. Tenth incarnation is that of yet to come Kalki. Kalki represents the future evolution of mankind. When Darwin proposed the theory of evolution, it was opposed tooth and nail by Church, and orthodox Christians still do not believe in evolution. In stark contrast to revealed religions, Hinduism has never indulged in suffocation of scientific thoughts, instead it has incorporated science in religion. Hinduism has been developed by intellectuals, who have coded the information for everyone to follow. While common Hindus follow their religion without knowing the real meaning behind the myths and customs, it is expected that Hindu intellectuals would know and preserve the scientific meaning for posterity. Unfortunately, a lot of scientific understanding has been lost due to a millenium of foreign rule. It is the duty of educated Hindus to rediscover the lost knowledge and bring back the glory of Hinduism. Hinduism is not a set of mumbo-jumbo supposed to be delivered to a chosen fellow by God, but it is a result of concerted effort of generations of intellectual sages to discover the nature of ultimate reality. Sages deified scientific phenomena and Hindus are worshippers of science. To illustrate this point further, let's go to a city in central India, where Hindus come from all over India to worship time god.

17.5: Legend of Vikramaditya

Ujjain is a city in the state of Madhya Pradesa. City of Ujjain was once ruled by the legendary king Vikramaditya. King Vikramaditya was known for his valor and impeccable justice. His court was adorned by nine famous courtiers called Navaratna (nine gems), who were great scholars in different fields of knowledge. Despite extensive effort, Vikramaditya can not be identified with any known historical king. Ujjain is famous for the temple of Mahakala. There is no other temple in India, where Mahakala is worshipped.

Is there a meaning behind the legend of Vikramaditya and the worship of Mahakala? The real meaning is revealed by considering the meaning of these words. Vikramaditya is made by joining prefix "Vi" to words "Krama"and "Aditya". "Krama" means order, "Aditya" means sun and prefix "Vi" means deviation. Therefore, etymologically Vikramaditya means the change in the course of sun. What is significant is Ujjain is located on the tropic of cancer. Thus, sun comes to Ujjain during its northward journey, changes its course, and starts its southward journey. Vikramaditya is sun itself changing its journey at Ujjain. Nine gems in the court of Vikramaditya are nine planets of Solar system. Mahakala is made by joining words Maha, great, and Kala, time. Thus Mahakala means Time the great. Ujjain was known as Ujjayini in ancient times and was the capital of ancient empire Avanti. Ujjayini was the center of Indian civilization for several centuries and famous for its astronomical observatory. Ujjayini was equivalent of Greenwich, from where time was synchronized all over India and even abroad. New day commenced when it was six A.M. in Ujjayini. When it is six in the morning in Ujjain, it is midnight in Britain. It is from this ancient system of changing date in the morning in Ujjain that changing date at midnight has been arrived at. It is little strange to change the date when everyone is sleeping. As time was synchronized in a large part of the world

according to Ujjayini standard time, it was only natural to designate the god of Ujjain as god time himself, and therefore the name Mahakala, Time the great. Mahakala is often identified with Lord Siva, but there are no strong reasons to do so.

The rise and fall of Hinduism is connected to the rise and fall of science, and scientists everywhere in the world are following the spirit of Hinduism without even realizing it. The spirit of Hinduism is logic and skepticism, and with this skepticism in mind we are going to take a closer look at the most accepted el of the universe, the Big Bang model.

"I can live with doubt and uncertainty. I think it's much more interesting to live not knowing than to have answers which might be wrong."
- Richard Fevnman

18: Whither Big Bang?

Every ancient civilization believed in an egg-shaped universe, which was based on the Vedic cosmology. Later due to the confusion of Prthivi (observer space) with earth a geocentric model of the universe developed. With Christianity adopting this idea, earth and human beings received a favorite place in God's scheme of things. Church not only believed in these ideas, but persecuted anyone who dared to speak against these ideas. Following the rise of Church to power a long dark age commenced. Modern science had a difficult birth in the cradle of christianity. Scientists were persecuted and burnt for formulating scientific theories, which Church perceived to be against its theory of creation. It is not a coincidence that modem science is against the idea of God and anything special about earth and human beings. In India this type of conflict never arose. Hinduism was raised on the foundation of science and freedom of inquiry. There

is not a single incident of a scientist being persecuted by religious authorities in India.

The challenge to Geocentric cosmology came in 1543, when Copernicus made a bold proposition that earth may not be at the center of the universe and may be rotating around Sun. Science never looked back after that. Kepler developed the idea further, based on which Newton developed the theory of gravitation. In 1915 Einstein generalized the theory of gravitation and provided the framework of modern cosmologies. In 1929 Hubble published his results describing the recession of galaxies. Hubble observed a simple relation between the recession velocity of a galaxy and its distance from earth. The day of the Big Bang Cosmology had arrived.

18.1: Big Bang Cosmology

In the Big Bang model the universe starts with a gigantic explosion, before which all the mass-energy of the universe was concentrated in a point of singularity. Space was created with this explosion and is expanding according to Hubble's law. Hubble's law states that recession velocity of a galaxy relative to another galaxy is proportional to the distance separating them. There is an implicit assumption that the universe is same in all direction. The universe is symmetric around each point in the universe, and it looks same from anywhere in the universe. There are no edges of the universe and there is no center of the universe in this model. This is illustrated by means of an expanding balloon. The universe is considered a four-dimensional analogue of the surface of a balloon, on which each point is moving away from other point. The Big Bang model of the universe is illustrated is Figure 18.1. The universe is a four-dimensional analogue of the surface of a sphere. There is no inside or outside of this surface as this surface is all that exists.

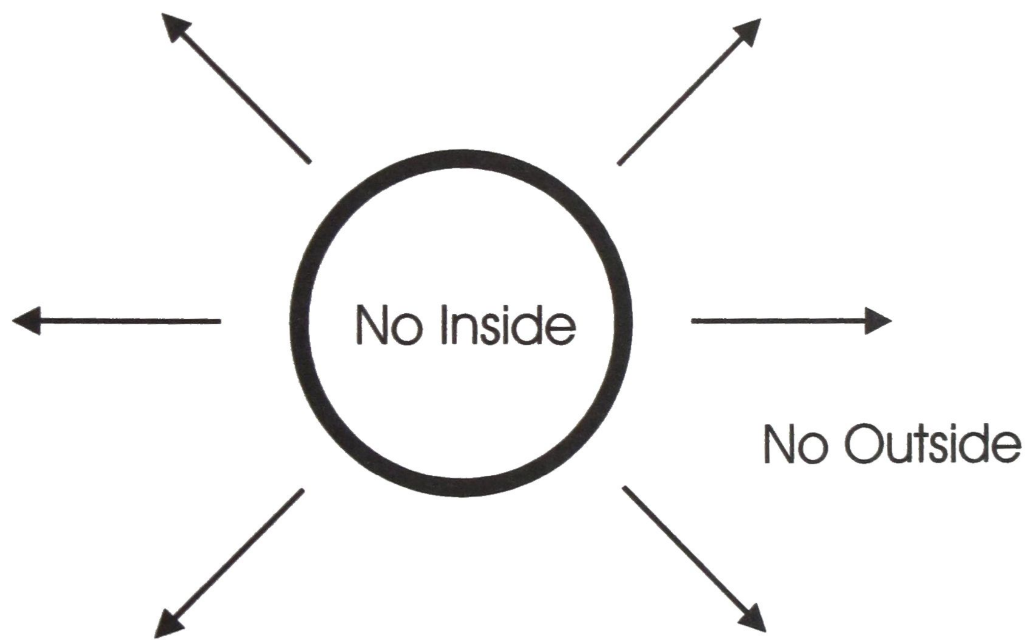


Figure 18.1: The Big Bang model of the universe

How did scientists figure out that the universe is like the surface of a sphere? We find the answer in the bible of cosmology, Gravitation[l]. Prevailing scientific wisdom demands from the universe that it be of uniform density, isotropic, and closed. First two requirements mean that the universe should be same everywhere and third requirement means that the universe should have no boundary. The surface of a sphere satisfies all these requirements. The questions like "What is inside the sphere" and "What is outside the sphere" are considered meaningless as the surface of the sphere is the whole universe, and there is no outside or inside. The bible of cosmology further says that excursion off the sphere is physically meaningless and is forbidden. We should note that it is one thing to demand from the universe to be what scientists consider elegant, and it is another thing for the universe to oblige the scientists by being so. The ultimate test for any theory of cosmology is the universe itself. Any theory must not contradict the universe, and we will see shortly that the Big Bang Cosmology has failed in several respects. Failures of the Big Bang Cosmology were apparent from the beginning itself, and soon after its birth another rival cosmology was developed to explain the universe better.

18.2: **Steady State Cosmology**

In 1948 a rival cosmology named Steady State Cosmology was formulated by Hermann Bondi, Fred Hoyle and Thomas Gold. The Steady State Cosmology differed from the Big Bang Cosmology in several respects. The universe is considered without a beginning and a small amount of matter (hydrogen atom to maintain charge neutrality) is assumed to be created continuously between the galaxies. The universe is considered expanding *w* both models and looks same from every point in the universe. The important difference being that in the Big Bang Cosmology

universe keeps changing with time as it is growing bigger, while in the Steady State Cosmology the universe is always the same, presumably an infinite universe expanding and remaining infinite. For nearly two decades the controversy raged on and finally in 1965 scientific opinion turned in the favor of the Big Bang Cosmology after the discovery of the cosmic background radiation.

Currently the the Big Bang model is the most widely accepted model of the evolution of the universe. However, the Big Bang model has a number of difficulties, some of which are supposed to be overcome using inflation like flatness and horizon problems. Some difficulties still remain like problems of singularity, dark matter, antimatter, age of the universe, evolution of galaxies, monopole, entropy and rotation. Let's have a look at these problems.

18.3: Singularity Problem

The Big Bang model is based on the observation that universe is expanding. If we look backward in time, then universe will look smaller in extent, and if we extrapolate it all the way to the beginning of the universe, then the universe will become a point. What happens to the mass-energy of the universe? One of the most sacred principles of physics is that mass-energy is always conserved. Mass-energy can neither be created nor be destroyed. The conservation principle then demands that in the beginning all the mass-energy of the universe was concentrated in a point. The point is called a singularity because its mass-energy density is infinite. In the Big Bang model there is a singularity at the beginning of the universe, and if there is sufficient mass-energy to close the universe, universe will end in another singularity. Though scientists don't like singularities, there is no way to avoid it currently. Scientists hope that a unified theory of quantum

mechanics and gravity will be able to solve the singularity problem. The attempts to avoid the singularity at the beginning of universe have not been successful so far.

18.4: Horizon Problem

Horizon problem was pointed out by Misner in 1969[2]. The problem is related to causal connectivity. According to relativity no signal can travel faster than the speed of light. The universe is about 15 billion years old according to modern physics, so we have a horizon around us of 15 billion light years. We can not receive any signal from a point beyond this horizon. If we look at an object 10 billion light years away, and then look at another object 10 billion light years away in the opposite direction, we find that they have similar environment. They have same expansion rate and same cosmic background radiation temperature. These two objects are however separated by a distance of 20 billion light years meaning that they are beyond the horizon of each other. Thus no signal has ever reached from one to other. In the language of modern science these two objects have never been causally connected. How did the regions in space not causally connected get homogenized? If the universe started with a gigantic explosion, parts of it should show randomness characteristic of an explosion. Why is the universe so uniform then? This is the question posed by Horizon problem.

An idea called "inflation" is used to find a way out of this problem, and the Big Bang models using this idea are called inflationary Big Bang models. According to inflationary model, the universe started with the Big Bang, which made the universe chaotic and inhomogeneous, but it was smoothed out later. Inflation is used to provide this smoothening effect in the Big Bang model. It should be kept in mind that there is no proof that , inflation ever happened. The inflation theory can not be tested

18.5: Flatness Problem

Flatness problem was pointed out by Dickein 1969[2]. It is related to omega, the ratio of average density of matter in the universe to critical density. Average density of matter is what is observed, and critical density of matter is the density needed to close the universe. If the density of matter is greater than critical density, universe will not keep expanding for ever, instead it will start contracting after a certain time, and universe will finish in a point of singularity. The measured value of omega is close to one. The problem is that, as the universe is between 10-20 billion years old in Big-Bang model, the omega at Big Bang must have been very close to one, up to 59 decimal points! We can understand the Flatness problem by an analogy of a stone thrown in space from earth. If the stone has sufficient kinetic energy, it will escape the gravitational pull of earth and will never come back. If the stone does not have sufficient kinetic energy, it will fall back on earth. Important point here is that kinetic energy and potential energy keep changing with time. In the first case ratio of potential energy to kinetic energy becomes zero, and in the later case it becomes infinity. Omega can also be defined as the ratio of potential energy to the kinetic energy. If omega were even slightly greater than or less than one, by now omega would be either close to zero or infinity. If omega were slightly greater than one, universe would have collapsed long time back. If it is close to one now, it has always been close to one, but why would the universe start with the value of omega so close to one. After all science does not believe in God who would set the value of Omega In exactly one. Inflation is used to solve this problem. Inflation drives omega to one regardless of its value before inflation takes

18.6: Age Problem

The age of the universe lies between 7 and 20 billion years depending on the value of hubble constant and other factors. The value of hubble constant itself is a matter of raging controversy. Different methods of measurement provide different values of the hubble constant. The age of oldest stars is between 13 and 17 billion years. The age of the elements is between 12 to 16 billion years. This brings a peculiar situation that universe may be younger than its constituents. Physicists favor the lowest value of hubble constant to avoid the age problem. However, there is no scientific basis for this preference.

18.7: Monopole Problem

Electricity and magnetism are intimately connected. Positive and negative electric charges are examples of electric monopoles, which can exist independently. On the other hand, magnetic monopole does not exist. A magnet always has a south pole associated with a north pole. If you cut a magnet in two, you end up having two magnets, each magnet having two poles. Why is it that electric monoples can exist, but magnetic monopoles can not? Are magnetic monopoles forbidden by nature? Scientists do not think so. Grand unified theories in conjunction with the Big Bang model predict the existence of magnetic monopoles. The mass of the monopole should be approximately ten million billion billion times that of the proton. New inflation theory predicts that there are many universes like several bubbles, and each universe contains one monopole. The search for monopoles has not been successful so far. If monopoles should exist, why are not they found? This is the question posed by the monopole problem.

18.8: Entropy Problem

The entropy problem was formulated by Roger Penrose in 1974[2]. Entropy is a measure of disorder. Second law of thermodynamics tells us that entropy of the universe always keeps on increasing. If the universe started with a Big Bang, entropy of the universe should be much larger than it is observed right now. According to Penrose, the entropy in the early universe was extremely low. The universe began as an extremely ordered system. This is in direct contradiction with Big Bang model according to which the universe began with a gigantic explosion, and therefore the universe was very chaotic in the beginning..

18.9: Antimatter Problem

As matter and antimatter are created and annihilated in pair. For every particle there exists an anti-particle, and when they come in contact, they annihilate each other. According to the standard Big Bang model, there should be same amount of matter and antimatter in the universe. However, our universe seems to be matter-dominated. Where is the corresponding anti-matter? Are there other galaxies made of antimatter in far recesses of the universe? Scientists have found no evidence of antimatter-dominated regions in universe. Why is it that in a supposedly symmetric universe distribution of matter and antimatter is asymmetric?

Considering that the Big Bang model has been in existence for 70 years, and so many brilliant scientists have worked to solve these problems, why is it that problems facing the Big Bang model refuse to go away? Is the framework of the Big Bang model correct? The question to ask then is if not the Big Bang then what? Is there an alternative to the Big Bang? Only serious Challenger to the Big Bang model is the Steady State model, which

has fallen out of favor after the discovery of cosmic background radiation. In next chapter we will deliberate if the problems facing the Big Bang Cosmology can be solved by the Vedic Cosmology.

"We shall not cease from exploration
And the end of all our exploring Will
be to arrive where we started And
know the place for the first time." - T.
S. Eliot

19. Vedic Cosmology

So far in this book we have come across the cosmic egg several times. We know that the Vedic sages considered the universe to be egg-shaped and all ancient civilizations accepted the Vedic wisdom. Now is the time to deliberate why wise sages chose egg to represent the universe. Was it because of a homely feeling or was there a solid reasoning behind this? Did sages look at the universe from outside? This is an unlikely scenario. In most likelihood they came to this conclusion based on sound reasoning.

19.1: The Cosmic Egg

Ws have seen that modern scientists consider the universe to resemble the surface of sphere, because they have reasons to

believe that universe is of uniform density, isotropic, and closed. What considerations led the sages to the representation of the universe as an egg? The answer to this question lies in the rotation of the universe. We have a clear statement to this effect in the Rgveda.

"Which was born first and which later ? How were they born? Who knows O wise people? They hold the universe by their strength and always keep rotating like a wheel."

Rgveda 1.185.1

This mantra dedicated to the observer space and light space clearly states them as rotating. As the universe is the sum of two, the universe is also rotating. We have come across the notion that sages considered the universe to contain a primordial fluid, which they named "Salila". As the apparent meaning of Salila is water, rest of the world came to believe that the universe was filled with water in the beginning. If the sages considered the initial state of the universe to be a fluid, and they considered the universe to be rotating, the rotation will have an effect on the shape of the universe. If we rotate a spherical volume of fluid, the fluid takes the shape of a spheroid. It shrinks along the axis of rotation and expands perpendicular to it keeping its symmetry around the axis of rotation. If we look at an spheroid and think about a familiar object that looks like it, what do we come up with: surprise of surprises, an egg!!!

19.2: Cakra of Visnu

In Hindu myhtology, Lord Visnu is shown as holding a cakra (wheel) in his hand. I have identified Visnu as the universe, and that makes him same as Supreme being, because in Hinduism God is not different from the universe, Now we can understand

the symbolism behind the cakra. Cakra is the representation of the rotation of the universe. Lord Visnu is shown as having four hands. The four hidden dimensions of the universe are his four hands. Now we may ask, if the universe is rotating, will not the scientists know about it?

19.3: Rotation of the Universe

Almost everything in the universe is rotating including the particles, earth and galaxies. It is natural to ask if the universe is rotating as well. In the framework of standard Big Bang model the universe is not rotating, and this creates a problem as to why its constituents are rotating. The Big Bang model considers the universe to be isotropic, meaning there is no preferred direction in space. If universe is rotating, then it has an axis, which is a preferred direction. So finding a proof of rotation of the universe is the end of the Big Bang model. Let's examine the assumption of isotropy carefully. If the universe is isotropic, there can not be any distinction between left and right. This was the most sacred belief of scientists till 1956. That year two young scientists Tsung-Dao Lee and Chen Ning Yang published a scientific paper in which they claimed that parity, a measure of symmetry, might not be conserved in weak interactions. They proposed an experiment to test their hypothesis. There was an atmosphere of disbelief. Famous physicist Wolfgang Pauli, Nobel Laureate, known for his exclusion principle wrote a letter saying that he did not believe that the Lord is a weak left-hander. The experiment was conducted by a female physicist Chien Shung Wu a few months later and confirmed the argument of Lee and Yang. In 1957 Lee and Yang were awarded Nobel prize in physics for their discovery, and Wu received Wolf prize in Physics in 1978. Since then every experiment has confirmed that weak interaction makes a difference between left and right.

Let's take a close look at strong, electromagnetic and weak interactions. It is obvious that model of the universe should not contradict the nature of these interactions. Weak interaction has complete disregard for many conservation laws including parity. Parity violation means that nature distinguishes between left and right. The question is how can this happen in an isotropic universe? Let's ask another question: What is so special about weak interaction? Why is it that it does not obey conservation laws like other interactions? There indeed is something very special about weak interaction: its range of interaction. The range of electromagnetic and gravitational interaction is infinite. The range of strong interaction is 10^{-15} meters and that of weak interaction is 10^{-17} meters. Weak interaction has the lowest range of all interactions. We can think of weak interaction as operating at such a subtle level where the rotation of the universe affects the conservation laws. It has been more than forty years since the discovery of parity violation, but cosmologists have not taken into account what particle physicists have proved. This is obviously an indirect proof of the rotation of universe. Should not there be a more direct proof of this? Will not it be obvious if the universe were rotating? Well, earth is also rotating, but we do not feel it. We will have to look for the effect of this rotation. If the universe is rotating, it can be rotating very slowly as universe is huge. In the beginning it may have been rotating faster. So is there a more direct proof of rotation of the universe? It turns out that we are just in luck.

Borge Nodland of the University of Rochester and John P. Ralston of the University of Kansas have found evidence of preferred direction in the universe and published their results in Physical Review Letters[l]. Scientific American, July 97 published a one page report on their findings under the heading "Science and the Citizen". After three years of painstaking research, Nodland and Ralston have found that polarized light from galaxies shows evidence of rotation. The twisting of

polarized light is a well known phenomenon called Faraday effect. However, this rotational effect is on top of Faraday effect, and depends not only on the distance of the galaxy from us, but it depends upon the direction of galaxy as well. The rotational effect is strongest in the direction of earth-Sextans axis and is weakest in the direction perpendicular to it. Nodland and Ralston have ruled out the possibility that the effect is local. The effect is at a cosmological level as it depends upon the distance of the galaxy.

The work of Nodland and Ralston has been challenged by other scientists, who think that the analysis is wrong. This is only expected as physicists are not going to abandon one of the their most cherished beliefs so easily. It must be backed up by further evidence. Meanwhile Nodland and Ralston have maintained the position that their analysis is correct. They have stated that their result can not be explained by conventional physics and the effect may be due to an unknown force or field or property of space. To me it is a direct proof of the rotation of the universe. Rotation of universe and continuous creation of matter and energy are two salient features of the Vedic cosmology. We have seen that the universe has the shape of an egg due to rotation, now is the time to discuss continuous creation, which will lead us to a way out of singularity.

19.4: Universe without Singularity

Universe started with an explosion according to the Big Bang model. At time equal to zero, all the mass-energy of the universe was concentrated in a point. This is certainly an unimaginable feat, as the universe is immense. According to Pauli's exclusion principle not even two electrons can occupy the same state, and here whole universe is considered to be inside a point. The Big Bang model does not give any clue as to why all the mass-energy of the universe should be there in the first place. This situation is

a direct result of the conservation of mass and energy, the most sacred principle of physics. Considering that the universe is expanding, extrapolating backward in time, the universe was as small as a point. As mass-energy of the universe must be conserved, all the mass-energy must have been there at time zero as well. We should note that conservation of mass-energy is violated in this case as well. This is equivalent to saying that all the mass-energy was created at time equal to zero. Mass-energy density of the universe was infinite at time equal to zero, which is called a point of singularity.

Scientists have been trying to find a way out of singularity. Ed Tryon published a paper with the title "Is the universe a vacuum fluctuation?" in Nature, December 1973. Tryon, wondering about where all the mass-energy of the universe came from, proposed that it is due to a vacuum fluctuation. Uncertainty principle allows for creation of energy for a brief period of time. However, mass-energy of the universe being so huge, this fluctuation can not remain for billions of years. Another important idea that Tryon came up with is that in fact there is no mass-energy in the universe. When scientists talk about mass-energy, they are overlooking an important form of energy, gravitational energy. Gravitation being an attractive force, gravitational energy is negative. What Tryon realized was that this negative form of energy exactly balanced positive form of energy, so that in effect total energy of the universe is zero. His brilliant idea has not however been developed in to a full-fledged cosmological model.

Another related idea is that of inflation. Inflation proposes that the universe entered a state of false vacuum soon after the Big Bang, and during that time the universe expanded exponentially, much faster than observed Hubble rate, doubling in size every 10^{34} second. During inflation positive form of mass-energy was created to balance the negative gravitational energy. In effect there was no creation of mass-energy. For this reason Alan Guth, who proposed inflation theory, considers the universe

to be the ultimate free lunch. What Guth realized was there was no way to end the inflation period. A modification to inflation, called new inflation, is invoked to end the inflation, but this new theory is even more exotic. It proposes that there are many universes, one of which is our known. Inflation has not solved the singularity problem, as inflation only produces part of the mass-energy of the universe, and as long as even a tiny amount of mass-energy was present at time zero, singularity problem will be there. The Vedas tell us that at time zero there was no mass-energy in the universe. It was a complete void. Space, mass and energy are continuously being created. As universe had zero mass-energy at time equal to zero, the universe did not start with a singularity.

19.5: Conservation of Space, Matter and Energy

In the beginning of this century, Einstein proved the equivalence of matter and energy. Today the Vedas have returned to tell an even greater truth: equivalence of space, matter and energy. Space is no different from matter and energy. In the beginning there was no mass-energy in the universe, because there was no space. Mass-energy is created due to expansion of the universe. The universe can not expand without creating mass-energy, and the universe can not contract without annihilating mass-energy. Thus the universe started with zero mass-energy and will end up with zero mass-energy as well. There was no singularity in the beginning and there will be no singularity at the end. If this is the case, then mass-energy is being created right now as the universe expanding. So should not scientists be witnessing this creation? Infact they are witnessing it right now, but have no clue as to what is it mat they are observing. I am talking about gamma-ray bursts.

19.6: Gamma-ray Bursts

Scientific American, July 97 has an article on gamma-ray bursts on page 46. The article begins by stating that about three times a day our sky flashes with a powerful pulse of gamma rays. The origin of these gamma-ray bursts is a complete mystery. These bursts were discovered in 1973 and several theories were floated to explain this phenomenon. Black holes, supernovae or neutron stars were thought to be the sources of these bursts. Most accepted theory is that of binary neutron stars collapsing, but there are problems with this explanation. The gamma-ray bursts are intense, bulk of their radiation is in the range 100,000 to 1,000,000 electron volts implying a very hot source and its sources release more energy within minutes than sun will release in its entire lifetime. Astronomers believe that these bursts are coming from cosmological distances probably three to ten billion light years away. The sources of these bursts are distributed isotropically, that is their number is same in any direction. The question is why? Are we in the center of a large spherical shell over which the sources of these bursts are uniformly distributed? The idea of us being in the center of this shell is unnerving to the scientists, because center is a special position and science does not allow for us to be in a special position compared to any other point in the universe.

We have seen that the Vedic scientists consider the creation of mass-energy to be taking place continuously at the surface of the universe. We have also seen that creation of mass-energy is related to the expansion of space. As the universe is huge now, its expansion will create immense radiation. As surface of the universe envelopes us from all directions, and this surface is far away from us, the gamma ray bursts will seem isotropic and seem to come from the outer reaches of the universe. What is most significant is that these gamma-ray bursts are taking place three times a day, and this is exactly the frequency at which creation of

mass-energy is taking place according to the Vedic scientists. Here are some verses from the Rgveda to this effect:

"O Savita, give us wealth everyday three times a day."

Rgveda 3.56.6

"O Agni, we know you have wealth to give three times a day to mortals." Rgveda 7.11.3

"O Soma, give us three times a day, what you have milked."

Rgveda 9.86.18

There is a concept called "Digdaha" related to this creation at the surface of the universe. Digdaha means fire at the boundaries, and refers to the immense radiation being generated at the ends of the universe. This creation of mass-energy and space is called Yajiia. Havana is performed three times a day because creation takes place three times a day. Without Yajiia there would be no universe, and it is for this reason that Yajiia is given so much importance in the Vedas. In the Brahmanas Visnu is equated to Yajiia again and again (Satapatha Brahmana 1.1.2.13, 5.2.3.6, 5.4.5.1, Kausltaki Brahmana 4.2, 18.14). The reason being as the universe (Visnu) expands creation of mass-energy and space (Yajiia) takes place. Yajiia is also called Vitana meaning expanding, because Yajiia is related to the expansion of the universe. Following question is asked in the Vedas:

"I ask you the remotest end of earth. I ask you what is the origin of universe." Rgveda 1.164.34, Yajurveda 23.61

And the answer is given as,

This attar is the remotest end of earth. This Yajna is the origin of universe.” Rgveda 1.164.35, Yajurveda 23.62

Remotest end of the observer space is the boundary of the universe, and that is where the creation is taking place, therefore this boundary is considered the altar. Now we are in a position to piece together the evolution of the universe according to the Vedas.

19.7: Evolution of the Universe

Before the creation, there existed an ultimate reality beyond our conceptions of space, matter and time. The ultimate reality desired to create the universe. With this desire, the universe started as a small fluctuation creating a tiny region of space with a very small amount of mass-energy. In the beginning there was neither space nor mass-energy. The universe did not start with a Big Bang. There was no mass-energy available to create this Big Bang. When I talk about creation of mass-energy, it implies that it is accompanied by an equal amount of negative energy due to gravitation or other attractive forces. In effect, there is no creation, the total mass-energy is always zero. Initially the forces of attraction and repulsion were in a very delicate balance. First fluctuation was not very successful, and the universe began to contract after an initial expansion. This contracting universe was called "Martanda". The forces of attraction and repulsion were then fine tuned and the universe started to expand again. This living universe was given the name "Vivasvana". Space and mass-energy are closely related. When the universe became of a certain size, there became sufficient energy available for the formation of the first pair of particle and its anti-particle. This first pair was given the name "Yama" or "Manu". With further expansion of the universe mass-energy of the universe kept increasing with the formation of more pairs of particles and anti-particles. Somewhere along the line universe separated in three spaces, observer, intermediate and light. Electric force was the major

force causing the expansion of the universe. In early universe surface tension of the universe was the most important force coristraining the expansion of the universe. The battle of these two forces was immortalized in the epic battle of Indra and Vrtra. The particles and anti-particles annihilated each other changing in radiation. This radiation was called Rudra. The radiation gave rise to radiation pressure, which pushed universe to expand. Radiation pressure was given the name Maruta, and its components were described as sons of Rudra. As the universe was expanding, it started to rotate as well. This rotation gave rise to parity violation resulting in the production of a small excess of matter over antimatter. This small excess of matter accumulated over the age of the universe making the universe matter dominated. The annihilation of anti-matter was represented as the slaying of dark people by Indra. The remnants of radiation from the early universe is observed as the cosmic background radiation, which was named Visa.

As the universe started with zero matter and energy, the universe must have started cold, very cold. As the universe started to rotate, the shape of the universe changed to a spheroid or an egg. With the increase in mass-energy content, the gravitational pull also increased, which acted to slow down the expansion of the universe. The expansion rate and rotational velocity of the universe has been constantly changing during the evolution of the universe as the strength of the forces of expansion and contraction have kept changing. The universe started with zero expansion and rotational velocity, reached to a maximum, and men slowed down. We are currently somewhere in the later phase of expansion, when the expansion velocity and rotational velocity both are very low. As the universe is a spheroid, it has a center and an axis of rotation. The universe has an eccentricity, which is changing with time. Halfway through the evolution of the universe, the forces of expansion and contraction will come to exact balance, bringing the universe to a complete halt, both

expansion and rotational velocity becoming zero. The universe at this point will become a perfect sphere. The later half of the evolution will then begin with the contraction of the universe and probably rotation of the universe in opposite direction. During this phase mass-energy of the universe will be gradually reduced. Finally universe will end where it began its journey with zero space, matter and energy.

19.8: Trinity

In Hinduism Brahma, Visnu and Mahesa form a trinity. Brahma is the creator of the universe, Visnu the protector and Mahesa the destroyer. Brahma means expansion, and expansion of the universe takes place with the creation of matter and energy, thus Brahma is creator. Visnu is the life-principle of the universe, who is not different from the universe, thus he is the protector. Mahesa or Mahadeva or Siva is Vedic god Rudra representing radiation. As radiation is the result of annihilation of particles, he is related to destruction. But what is annihilated is born again as another set of particles, and this dance of creation and annihilation continues. This is the cosmic dance of Siva, and therefore he is called Nataraja, Lord of the dancers. With the Vedic framework in mind, we are in a position to solve the problems plaguing the Big Bang Model.

19.9: Horizon Problem

Horizon problem is related to causal connectivity. How did the regions in space not causally connected get homogenized? If the universe started with a Big Bang, it should be chaotic and inhomogeneous. Inflation is used to provide a smoothening elect in the Big Bang model, but it can not be accepted as a proof,

unless it is proved that inflation ever took place. Otherwise, it can only be thought of as an ingenious device designed to hide the fatal flaws of the Big Bang Model.

The Vedic model tells us that the expansion of the universe started smoothly and has been smooth ever since. The universe didn't start with an explosion. The expansion was very slow in the beginning. Thus all parts of the universe were in equilibrium in the beginning, and the expansion has been smooth ever since. Thus two parts of the universe, which are not causally connected today, were causally connected in the beginning for a long time, and it is no wonder that the universe looks so smooth.

19.10: Flatness Problem

The ratio of kinetic to gravitational energy in the universe is called omega. The measured value of omega is close to one. As the universe is between 7 to 20 billion years old in the Big Bang model, the omega at Big Bang must have been very close to one, up to 59 decimal points. If omega were even slightly greater than or less than one, by now omega would be either close to zero or infinity. Why was omega so close to one at the Big Bang? Stated in another way, why are the kinetic and gravitational energy in such a delicate balance? One possible explanation is the unverifiable Inflation. The Vedic model provides an elegant solution to flatness problem.

Total energy of the universe is equal to zero. Total energy of the universe can be divided in positive energy and negative energy. Positive and negative energies balance each other. Forms of positive energy are mass-energy, kinetic energy and rotational energy, while forms of negative energy are gravitational energy and surface energy. At time zero, all forms of energy had zero value, and their values have changed during the course of evolution subject to the condition that total energy must be zero

at all times. Thus gravitational energy and kinetic energy will always remain in near balance. Kinetic energy and gravitational energy are not exactly equal though, because there are other forms of energy. In the beginning there was neither kinetic energy nor gravitational energy. As kinetic energy increased so did the gravitational energy. Net energy of the universe remains zero all the time, and thus omega always remains close to one.

19.11: Age Problem

The age of the universe lies between 7 and 20 billion years depending on the value of hubble constant and other factors. The value of hubble constant itself is a matter of raging controversy. The age of oldest stars is between 13 and 17 billion years. The age of the elements is between 12 to 16 billion years. This brings a peculiar situation that universe may be younger than its constituents. Physicists favor the lowest value of hubble constant to avoid the age problem. However, this choice is completely arbitrary.

In the Vedic model, the universe began with zero space volume, zero mass-energy and zero hubble velocity. With the creation of matter-antimatter and their annihilation the hubble velocity increased gradually. As space expanded further the gravitational pull of mass-energy started to slow down the expansion. Thus the hubble velocity reached a maximum value, and then started to decrease slowly. In the Vedic model, a condition like that of the Big Bang emerges when the hubble velocity reaches a maximum. However, by this time the universe is considerably old. In the standard Big Bang model, probably more than half of the age of the universe is not even being looked into. Once the first half of the expansion is taken into account, the age of the universe may more than double. This may solve the age problem.

19.12: Monopole Problem

Grand unified theory in conjunction with the Big Bang model predicts the existence of magnetic monopoles. The mass of the monopole should be approximately ten million billion billion times that of the proton. New inflation theory predicts that there are many universes like several bubbles, and each universe contains one monopole. Again, predictions of inflation can not be tested. No monopoles have been found.

In Vedic model the monopoles do not exist. The universe was immensely dense in the beginning giving rise to monopoles in the Big Bang model. As universes did not possess such high density in the Vedic model, the monopoles can not be formed.

19.13: Entropy Problem

Entropy is the measure of the disorder in a system. According to Penrose, the entropy in the early universe was extremely low. The universe began as an extremely ordered system. This is in direct contradiction with the Big Bang model.

In the Vedic model, the entropy problem is solved, as the universe began with zero entropy. There was no matter and energy at time equal to zero, so entropy was zero as well. Since the mass-energy of the universe has increased slowly, the entropy has also increased slowly. Entropy will reach its maximum value halfway through the evolution of the universe, when its expansion comes to a halt. So far the universe follows the second law of thermodynamics, which states that entropy of a closed system keeps on increasing. During the second half of the evolution, entropy will start to decrease and the universe will finally end up with zero entropy.

19.14: Antimatter Problem

As matter and antimatter is created and annihilated in pair, in the standard Big Bang model there should be same amount of matter and antimatter in the universe. However, our universe seems to be matter-dominated. Where is the corresponding anti-matter? Are there other galaxies made of antimatter in far recesses of the universe?

In the Vedic model, the universe is rotating. So there is a small excess of matter over antimatter due to the violation of symmetry. As matter and antimatter are continuously being created at the surface of the universe from the beginning of the universe with an excess creation of matter over antimatter, there is left over matter after annihilation of all the antimatter. This small excess of matter has accumulated over the age of the universe and our universe consists of matter only.

19.15: Implications of Vedic Model

The universe started with zero value of all properties: volume of the universe, hubble velocity, rotational velocity of space, entropy, matter content, energy content, temperature etc. All properties are well behaved functions in the Vedic model with no singularity at the beginning or the end. As space expands and rotates, matter and antimatter is created at the surface of the universe.

In the Vedic model, there is a center of the universe, which is at absolute rest. The center of the universe is called Hiranyagarbha, Golden Womb, in the Vedas. There is an axis of the universe passing through this center around which universe is rotating. This axis is represented in Hinduism as Sivalinga. Hindu devotees pour milk or water on Sivalinga, which represents the flow of matter and energy from the boundary of the universe towards the center of the universe. The Vedas tell us that we

have a specific location in the universe. It is important to find out the center of the universe, the axis of rotation and our location in the universe. The model of the universe in the Vedas is illustrated in Figure 19.1. Space can be divided in two parts: manifested space and unmanifested space. Our universe is the manifested space, and it is expanding into unmanifested space creating matter and energy. The creation of matter and antimatter continues as long as the universe is expanding. As the universe is expanding at present, new matter and antimatter is being created at the surface of the universe even now. This means that if we look in the direction of the center of the universe, we will find older matter, and if we look in the opposite direction we will find younger matter. Thus towards the center of the universe older galaxies will be seen, while in the opposite direction younger galaxies will be seen. The surface of the universe is in a violent state where matter and antimatter is being created continuously. It follows that we have a specific location in this universe. It will be highly improbable that we are at the center of the universe.

19.16: Cyclic Cosmology

In the Big Bang model the universe can be either open or closed. The fate of the universe is decided by the balance of kinetic and potential energy. The fate of the universe is often compared with a projectile thrown from earth. If the projectile has sufficient velocity, it can escape from earth's gravitational pull, otherwise it will reach a maximum height and then fall back on earth. In the Vedic model a new twist is added to this analogy. Imagine a scenario in which the gravitational pull on the projectile increases as it goes further. In this case the projectile can never escape from earth's gravitational attraction. Similarly, the universe can not keep expanding forever. The universe can only reach a maximum size and then collapse back on itself. The process of

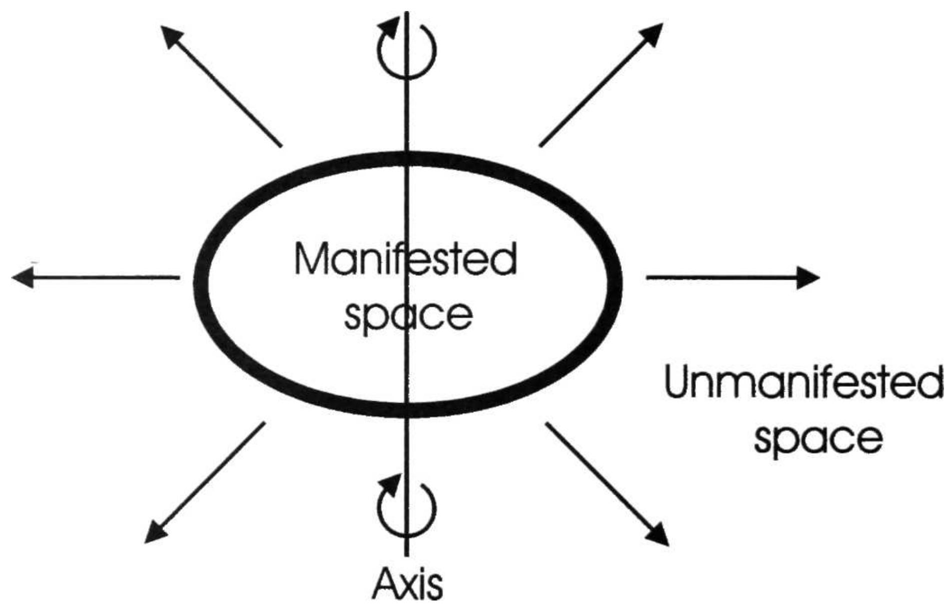


Figure 19.1: Vedic model of the universe

formation of the universe and its dissolution carries on according to the Vedas. The life of the universe in one cycle is called a "Kalpa". Cyclic nature of the universe is described in the famous "Aghamarsana" hymn of the Rgveda. Aghamarsana means "sin-effacing" and this hymn is recited daily by Brahmanas.

Rgveda 10.190 Sage: Madhuchandasa Aghamarsana; Deity: Bhavavrtta;
Metre: Anustupa

1. Cosmic law and order were born from the inflaming heat. Then night was born and then foaming ocean.
2. From foaming ocean time was born. Night and day were made by the controller of the world like opening and closing of eye.
3. Founder created sun and moon as earlier, heaven and earth, atmosphere and Svah as well.

Lord Krsna says to Arjuna in Gita, the epitome of Hindu philosophy:

"O son of Kunti! All beings return to my nature at the end of Kalpa, and I create them again in the beginning of Kalpa."

GIta 9.7

I control nature and create all these beings dependent on nature again and again."

GIta 9.8

Modern scientists have also considered the possibility of the universe expanding and contracting again and again. Cyclic cosmology assumes that the universe is closed and collapses back on itself and the cycle is repeated. It has been calculated that starlight will accumulate from cycle to cycle and it will cause each cycle to be longer than the earlier cycle. There can not be more 100 cycles according to these calculations. Some

researchers have even looked for matter/radiation from earlier cycle.

According to the Vedic model these views about the cyclic universe need to be modified. When the universe collapses back, it has zero mass-energy. A universe of zero space volume can not have any mass-energy, because it can not have any negative potential to balance the mass-energy. Thus there is no starlight accumulation, and there can not be any matter/radiation from earlier cycle in our universe. Each cycle is completely independent, and thus there is no limitation on how many cycles there can be. There is no way to know about earlier cycle, as no information can travel from one cycle to another.

19.17: Vedic Model and Other Cosmologies

Like the Big Bang model, the Vedic model assumes that the universe has started from a point and is expanding. However, unlike the Big Bang model universe starts cold with zero mass-energy, and is rotating as well as expanding. The universe has a center, an axis of rotation and a non-spherical shape. There is a similarity with the Steady State model that mass-energy is constantly being created. The difference is that universe is not considered infinitely old, and the creation of mass-energy is only during the expansion phase of the universe. During the contraction phase, the mass-energy is annihilated, so that universe ends without a singularity. Table 19.1 shows the comparison between the Vedic and modern cosmologies.

Table 19.1: A comparison of Vedic and modem

Big Bang Cosmology	Steady State Cosmology	Vedic Cosmology
Universe had a beginning	Universe had no beginning	Universe had a beginning
Universe is not rotating	Universe is not rotating	Universe is rotating
Universe has no center	Universe has no center	Universe has a center
Universe is a spherical surface	Universe has no shape	Universe is a spheroid
Universe has no axis	Universe has no axis	Universe has an axis
Universe has no boundary	Universe has no boundary	Universe has a boundary
All the mass-energy was created in the	There was no beginning	Mass-energy content was zero in the beginning
There is no creation of mass-energy now	Mass-energy is continuously being created	Mass-energy is continuously being created
There is no creation of mass energy taking place	Mass-energy is created everywhere in the	Mass-energy is created at the surface of the universe
There is no creation of mass-energy	Creation takes place in the form of hydrogen	Creation takes place in the form of matter and anti-matter
Universe started very hot	Universe was always same	Universe started very cold

Table 19.1	**Svnodic Period**	**Hvmn combinations**

"My suspicion is that the universe is not only queerer than we suppose, but queerer than we can suppose." - J. B. S. Haldane

20. The Astronomical Code

Professor Subhash Kak is an eminent scientist, philosopher, and Indologist. He has demonstrated that the Brahmi script is derived from the earlier Indus-Sarasvati script. In his book "The Astronomical Code of the Rgveda" Professor Kak has described the astronomical information in the arrangement of the Vedic verses, which will be briefly described in this chapter[l]. I will remind my readers that this astronomical information is coded in the lay-out of the verses, and it is my opinion that there is no astronomical information in the meaning of the verses. Subject matter of the Rgveda is cosmology, and not astronomy. The interpretation of verses for astronomical dating of the Vedas, for example by Jacobi and Tilak, is entirely unsatisfactory. I should also stress that What Professor Kak has discovered may only be the tip of the iceberg. The Vedas might be carrying much more scientific information in their arrangement, if the mind-boggling physics of the Vedas is any indication.

The Rgveda is divided in two ways. Most commonly, the Rgveda is divided in ten books called Mandalas. Each mandala is further divided in hymns called Suktas and each Sukta contains several verses called Rcas. Each Rca is set to a metre called Chanda. There are seven prominent Chandas. Each Chanda has a set number of padas, and padas have a set number of syllables. Most popular Chanda is Gayatri, which consists of three padas, each of eight syllables, thus Gayatri Chanda consists of twenty four syllables. Satapatha Brahmana 10.4.2.23-24 describes the Rgveda as having 432,000 syllables, but actual count is much less, only 394,317. The huge gap is irreconcilable, because the Vedas have been extremely well preserved. The authors of the Satapatha Brahmana have simply assumed the number of syllables in order to give additional meaning to the Vedas, again a sign of loss of Vedic science.

Ten books of the Rgveda contain following number of hymns: 191,43, 62, 58, 87, 75,104,92,114 and 191 consecutively. The first and last books are ascribed to a number of sages, while books two to eight are considered family books, each book containing hymns by a prominent sage and his family members. We have met these sages in a previous chapter. Book nine is also ascribed to a number of sages, but the deity of all hymns in this book is Soma, while rest of the books contain hymns dedicated to a large number of deities. Total number of hymns in the Rgveda is 1017. There are eleven additional hymns in the Rgveda called Valakhilya hymns, which are found in the eighth book from hymns 49 to 59. The Valakhilya hymns consist of eighty verses. Total number of verses in Rgveda is 10,442 without counting the Valakhilya hymns.

The Rgveda is also divided in eight parts called Astaka, each further subdivided in eight sub-parts called Adhyaya. Thus the Rgveda contains sixty four adhyayas. Adhyayas are further divided in Vargas. There are 2006 Vargas in the Rgveda. There are varying number of verses in each Varga.

Total number of hymns in the Rgveda is 1017. The Rgveda considers universe to be divided in three spaces, thus there are 339 verses per space. What is the significance of number 339? Number 339 is related to another sacred Hindu number 108. Hindus recite sacred mantras 108 times. Average distance of sun from earth is approximately 108 times the diameter of sun and average distance of moon from earth is approximately 108 times the diameter of moon. It is for this remarkable coincidence that sun and moon seem to be of same size as viewed from earth. Number 339 is approximately *n* times number 108. This represents the number of disks of sun or moon to cover their paths across sky. Sum of number of hymns in books 1 and 10 is 382. Sum of number of hymns in books 2, 3, 5 and 7 is 296. Number 339 is the average of 296 and 382, and also the sum of number of hymns in books 4, 6, 8 and 9. Number 339 is 43 less than number 382 and 43 greater than 296. Numbers 296,339 and 382 are the number of sun-steps during the winter solstice, equinox and summer solstice respectively. Ratio of 382 to 296 is 1.29 and represents the ratio of duration of the longest to the shortest day where composition of the Vedas took place.

The arrangement of hymns in the Vedas contains information about sidereal and synodic periods of planets Mercury, Venus, Mars, Jupiter and Saturn. Table 20.1 shows the astronomical information about synodic periods of planets.

The probability of these numbers showing up at random is very small, and proves that the Vedic sages knew the planetary periods well and incorporated that knowledge in the arrangement of the Vedas. I hope that one day we will understand the meaning of the Vedas completely and appreciate our invaluable Vedic heritage.

Table 20.1: Structure of Rgveda and Synodic Period of

Table 19.1	Svnodic Period	Hvmn combinations
Mercury	**115.88**	**118 = Books (2+6)**
Venus	**583.92**	**583 = Books (1+5+9+10)**
Mars	**779.94**	**779 = Books (1+5+7+8+9+10'**
Jupiter	**398.88**	**398 = Books f2+3+5+8+9)**
Saturn	**378.09**	**377 = Books (2+4+5+6+9)**

Table 20.1: Apparent meaning Scientific meaning

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Scientific Glossary

Vedic term	Apparent meaning	Scientific meaning
Hiranya	Gold	Color of energy
Salila	Water	Primordial fluid
Brhaspati	God Brhaspati	Expansion of the universe
Indra	God Indra	Electric force
Vrtra	Demon Vrtra	Surface tension
Prthivi	Earth	Observer space
Antariksa	Atmosphere	Intermediate space
Dyau	Heaven	Light space
Visnu	God Visnu	Universe
Vayu	Air	Field
Agni	Fire	Energy
Apah	Water	Matter-antimatter
Rudra	God Rudra	Radiation
Maruta	Wind	Radiation pressure
Gramya	Domesticated animal	Boson
Aranya	Wild animal	Fermion
Vayavya	Bird	Field particle
Aja	Goat	Localized energy
Avi	Sheep	Avi particle
Asva	Horse	Asva particle
Gau	Cow	Gau particle
Savita	God Savita	Creation-annihilation energy

Table 20.1: Planets	Apparent meaning	Scientific meaning
Pusa	God Pusa	Set of particles
Varuna	God Varuna	Electron
Mitra	God Mitra	Proton
Aryama	God Aryama	Neutron
Soma	Soma plant	Electric charge
Indu	Soma juice	Electricity
Madhu	Honey	Magnetic field
Asvin	Twin gods	Magnetic poles
Surya	Sun	Light
Usa	Dawn	Creation of particles
Nakta	Night	Particle annihilation
Vasistha	Sage Vasistha	Nucleus
Cakra	Wheel	Rotation of the universe

Notes

Chapter 1: Vedic Legacy

1. Mimamsaka(1976),p. 40
2. Satavaiekar (1993)
3. Ramagopala(1985)
4. Vidyalankara(1976)
5. Pandeya(1994)
6. Upretl(1985)
7. Vedalankara(1981)
8. Rajaram(1993),p. 19-20
9. Das (1921)

Chapter 2: The Time Before Time

1. Lang (1995), p. 190
2. Catlin(1996)
3. Lang (1995), p. 201

Chapter 3: All this is Purusa

1. Lang (1995), p. 185

Chapter 5: Edge of the Universe

1. Lang (1995), p. 42-43
2. Parpola(1994),p.91

Chapter 6: Parallel Spaces

1. Guggenheim (1952), p. 166

Chapter 9: Quark Confinement

1. Horgan(1996)

Chapter 10: Matter and Energy

1. Ne'eman and Kirsh (1996), p. 198

Chapter 11: Electron, Proton and Neutron

1. Ne'eman and Kirsh (1996), p. 78
2. Ulansey(1989),p. 36
3. Ulansey(1989),p. 118
4. Cumont(1956),p. 190-191
5. http://users.aol.com/libcfl/xmas.htm
6. http://www2.xtdl.coni/~stabbott/**/ancientmithras**.htm
7. Cumont(1956),p. 201

Chapter 13: Let There be Light

1. Rao and Kak (1998), p. 80

Chapter 14: The Dance of Creation

1. Tilak(1925)

Chapter 18: Whither Big Bang

1. Misner, Thorne and Wheeler (1973), p. 704
2. Parker (1993), p.159-176 and 259-279

Chapter 19: Vedic Cosmology

1. Nodland and Ralston (1997)

Chapter 20: The Astronomical Code

1. Kak (1994)

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